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# (54) WIRELESS COMMUNICATION UNIT AND WIRELESS COMMUNICATION

SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a wireless communication unit that fuses an

interrogator in an RFID system with a

unit such as a wireless communication

unit such as a wireless LAN and a mobile phone

is with a simple configuration and to provide a

wireless communication system employing the
wireless communication unit.

SOLUTION: The wireless communication unit 4 can communicate with other wireless communication unit 19 and a wireless tag 3. In the case of making communication with the other wireless communication unit 19 and the wireless tag 3, the wireless communication unit

4 makes communication by using a transmission source 40, a modulator 42, a transmission RF section 44, a transmission/reception separator 45 and a 2-way wireless transmission/reception/wireless tag transmission/reception common antenna 46, which are in common to those of the other wireless communication unit 19 and the wireless communication unit 19 and a wireless tag 3. A demodulator 48 demodulates a signal received from the other wireless tag 3. Through the configuration above, one set of the wireless communication unit 4 can communicate with the other wireless communication unit 4 can communicate with the other wireless communication unit and the wireless tag 3 and the unit can be built up at a lower cost with a smaller size.

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#### CLAIMS

#### Claim(s)

[Claim 1] A bidirectional radio means to modulate the subcarrier sent from the source of transmission, to transmit to other radio communication equipments from an antenna, to receive the signal from other radio communication equipments with an antenna, and to get over, A signal is transmitted for the subcarrier sent from the source of transmission to a wireless tag from an antenna in a modulation or no becoming irregular. The radio communication equipment characterized by having the question means which reads the information which receives the signal which answers this signal, becomes irregular based on the information memorized, and is transmitted from a wireless tag with an antenna, gets over, and is memorized by the wireless tag. [Claim 2] The source of transmission which sends the subcarrier of said bidirectional radio means, and the source of transmission which sends the subcarrier of a question means are a radio communication equipment according to claim 1 characterized by the common thing.

[Claim 3] The antenna of said bidirectional radio means and the antenna of said question means are a radio communication equipment according to claim 1 or 2 characterized by the common thing.

[Claim 4] The antenna of said bidirectional radio means and the antenna of said question means are a radio communication equipment according to claim 1 or 2 characterized by being prepared separately, respectively.

(Claim 5] The antenna of said bidirectional radio means and the antenna transmitted to the wireless tag of said question means are a radio communication equipment according to claim 1 or 2 characterized by the common thing.

[Claim 6] The modulation of the subcarrier of said bidirectional radio means and the modulation of the subcarrier of said question means are the radio communication equipment of any one publication of claim 1–5 characterized by becoming irregular with a common modulation means.

[Claim 7] The recovery of the signal transmitted from other radio communication equipments and the recovery of the signal transmitted from a wireless tag are the radio communication equipment of any one publication of claim 1-6 characterized by

getting over with a common recovery means.

[Claim 8] A modulation means to modulate the subcarrier which sent said bidirectional radio means in the source of transmission which sends a subcarrier, and said source of transmission. The bidirectional wireless transceiver antenna which transmits the signal from said modulation means to other radio communication equipments, and receives a signal from other radio communication equipments, it has a recovery means to restore to the signal received from other radio communication equipments. Said question means The wireless tag transmitting antenna which transmits a signal to a wireless tag using the subcarrier sent in the source of transmission of said bidirectional radio means. The radio communication equipment according to claim 1 characterized by having the wireless tag receiving antenna which receives the signal transmitted from a wireless tag, and a wireless tag receiving antenna.

[Claim 9] A modulation means to modulate the subcarrier which sent said bidirectional radio means in the source of transmission which sends a subcarrier, and said source of transmission, The bidirectional wireless transceiver antenna which transmits the signal from said modulation means to other radio communication equipments, and receives a signal from other radio communication equipments, and receives a signal from other radio communication equipments. Said question means The wireless tag transmitting antenna which transmits a signal to a wireless tag using the subcarrier sent in the source of transmission of said bidirectional radio means, The radio communication equipment according to claim 1 characterized by restoring to the signal which is equipped with the wireless tag receiving antenna which receives the signal transmitted from a wireless tag, and is transmitted from a wireless tag with the recovery means of said bidirectional radio means.

[Claim 10] The radio communication equipment according to claim 9 characterized by having the signal coupler which combines alternatively with a demodulator the signal transmitted from the signal or wireless tag transmitted from other radio communication equipments.

[Claim 11] The bidirectional wireless transceiver antenna of said bidirectional radio means and the wireless tag transmitting antenna of a question means are the radio communication equipment of any one publication of claim 8-10 characterized by being a common antenna.

[Claim 12] The radio communication equipment of any one publication of claim 8-11 characterized by having the signal eliminator which sends the signal transmitted from

the wireless tag which received the signal from the source of transmission with delivery and an antenna at the antenna to a recovery means to restore to this signal. [Claim 13] The radio communication equipment of any one publication of claim 8–12 characterized by forming the transmission—and—reception eliminator which separates the sending signal to other radio communication equipments, and the input signal from other radio communication equipments.

[Claim 14] The radio communication equipment of any one publication of claim 1-13 characterized by restoring to the signal transmitted from a wireless tag using a part of subcarrier sent in the source of transmission.

[Claim 15] It is the radio communication equipment according to claim 2 which said source of transmission is established in a bidirectional radio means, and is characterized by said bidirectional radio means having the antenna which transmits a signal to a wireless tag.

[Claim 16] Transmission and reception of the signal to other radio communication equipments which a bidirectional radio means performs, and transmission of the signal to a wireless tag are a radio communication equipment according to claim 15 characterized by being carried out by the common antenna.

[Claim 17] Transmission and reception of the signal to other radio communication equipments which a bidirectional radio means performs, and transmission of the signal to a wireless tag are a radio communication equipment according to claim 16 characterized by being carried out by the separate antenna.

[Claim 18] A question means is the radio communication equipment of any one publication of claim 15–18 characterized by having the antenna which receives the signal transmitted from the signal and bidirectional radio means which were modulated based on information with the wireless tag.

[Claim 19] A question means is the radio communication equipment of any one publication of claim 15–18 characterized by having separately the antenna which receives the signal modulated based on information with the wireless tag, and the antenna which receives the signal transmitted from the bidirectional radio means.
[Claim 20] A modulation means to modulate the subcarrier which sent said bidirectional radio means in the source of transmission which sends a subcarrier, and said source of transmission, The bidirectional transceiver antenna which transmits the signal from said modulation means to other radio communication equipments, and receives a signal from other radio communication equipments, the receives to the signal received from other radio communication equipments. Said question means The bidirectional wireless receiving antenna which receives the

signal transmitted from the bidirectional transceiver antenna of said bidirectional radio means, The radio communication equipment according to claim 2 characterized by having the wireless tag receiving antenna which receives the signal transmitted from a wireless tag, and the recovery means which carries out the mixed recovery of the signal received with these antennas.

[Claim 21] The bidirectional wireless receiving antenna and wireless tag receiving antenna of said question means are a radio communication equipment according to claim 20 characterized by the common thing.

[Claim 22] The radio communications system characterized by consisting of the radio communication equipments and wireless tags of any one publication of claim 1–21. [Claim 23] It is the radio communications system according to claim 22 which can write information in said wireless tag and is characterized by the ability of a radio communication equipment to write information in a wireless tag on radio.

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[ 000] [Field of the Invention] This invention relates to the radio communication equipment and radio communications system which have a RFID function and a bidirectional radio function.

0005

[Description of the Prior Art] Conventionally, there is a communication device using wireless. <u>Drawing 14</u> is drawing showing the basic configuration of the common bidirectional radio communication equipments 1, such as wireless LAN (Local

data, etc. Although the signal-processing section which otherwise processes the data transmission-and-reception eliminators 23, such as a switch to separate or a diplexer, he antenna 24 which a signal transmits and receives, low noise amplifier, a filter, etc., ignal output part 28 which takes out the information signal input section 27 to input, eliminator 23 uses a switch or a diplexer properly with TDD (Time Division Duplex) or sidirectional radio are shown in drawing 14. Other radio communication equipments transmit, etc. are required, it omits in drawing 14. The transmission-and-reception .0003] The transmitting RF (Radio Frequency) section 22 to which the bidirectional he demodulator 26 which restores to the received signal, the data transmitted to nodulator 21, power amplification, a filter, etc., and the signal transmitted to other oidirectional radio communication equipment 1, the synthesizer control section for stations where the bidirectional radio communication equipment 1 communicates. other radio communication equipments 19 It is constituted including the recovery changing the frequency of the subcarrier sent in the source 20 of transmission in adio communication equipment 1 changes from the source 20 of transmission, a 9 are other bidirectional radio communication equipments and base transceiver communication equipment 19 The receiving RF section 25 which consists of the nputted into a modulator 21 from the information signal input section 27 in the performing the FURIKEN C hopping which changes the frequency of a signal to AreaNetwork) and a portable telephone. The bidirectional radio communication equipment 1 and other radio communication equipments 19 which perform radio communication equipments 19, The signal transmitted from a radio a FDD (Frequency DivisionDuplex) method.

[0004] The bidirectional radio communication equipment 1 of <u>drawing 14</u> explains actuation below as a communication device of a TDD method. The subcarrier sent in the source 20 of transmission of the bidirectional radio communication equipment 1 is modulated with a modulator 21 by the information signal inputted from the information signal input section 27. The modulating signal modulated with the modulator 21 is transmitted toward other radio communication equipments 19 through the transmitting RF section 22 and the transmission-and-reception separation section (switch) 23 from an antenna 24. On the other hand, an antenna 24 receives, it restores to the modulating signal transmitted to the bidirectional radio communication equipment 1 from other radio communication equipments 19 with a demodulator 26 via the transmission-and-reception eliminator 23 and the receiving RF section 25, and an information signal is taken out from the recovery signal output part 28. Actuation of the above bidirectional radio communication equipment 1 is actuation of general

bidirectional radio.

[0005] <u>Drawing 15</u> is drawing showing the interrogator 2 and the wireless tag 3 of a common RFID system. An interrogator 2 is the communication device which used wireless, and is constituted including the demodulator 34 which consists of the signal eliminator 32 which consists of the source 30 of transmission, a modulator 31, a circulator, a directional coupler, etc., an antenna 33, a synchronous detector, etc., the tag information recovery signal output part 35, etc. Although the information signal input section which inputs the transmit data to RF transmitting section, RF receive section, the signal-processing section, and the wireless tag 3 is required for others, it is omitting in <u>drawing 15</u>. The wireless tag 3 is constituted including the memory 39 which records the tag recovery section 38 which restores to the tag antenna 36 which receives the signal from an interrogator 2 and transmits a signal to an interrogator 2, and the tag modulator 37 which modulates the signal transmitted to an interrogator 2, and the signal received with the tag antenna 36, data, etc.

interrogator 2 is transmitted from an antenna 33 through the signal eliminator 32. It is demodulator 34, it is taken out from the tag information recovery signal output part 35. transmits to the wireless tag 3, and with the wireless tag 3, it restores to the received reading the information on the wireless tag 3, an interrogator 2 becomes irregular with information on memory 39 with the tag modulator 37 of the wireless tag 3. The signal modulated with the wireless tag 3 is transmitted to an interrogator 2 from the wireless tag 3. An interrogator 2 receives the signal transmitted from the wireless tag 3 with an [0006] Below, actuation of an interrogator 2 and the wireless tag 3 is explained. When in writing information in the wireless tag 3, using write-in information, the subcarrier modulating signal in the tag recovery section 38, and writes in memory 39. Actuation of the above interrogator 2 and the wireless tag 3 is actuation of the RFID system antenna 33. The modulating signal received with the antenna 33 is inputted into a a modulator 31, and the subcarrier sent in the source 30 of transmission of an received by the tag antenna 36 of the wireless tag 3, and the modulating signal transmitted from an antenna 33 receives a modulation using the are recording sent in the source 30 of transmission with a modulator 31 is modulated, and it demodulator 34 through the signal eliminator 32, and after getting over with a generally known well.

[0007] From the former, the RFID system is utilized in FA (Factory Automation) business etc. In recent years, it is broadly used for the picking system which classifies stock control and an article in the PD or the circulation field by the miniaturization of a wireless tag, or dc-battery loess-ization. The information on the wireless tag

acquired by the interrogator is immediately sent to an access point using bidirectional radio communication equipments, such as wireless LAN prepared apart from the nterrogator, and is processed in the management processing section, and the gestaft which manages goods often consists of such PD and the circulation fields. Moreover, also when writing information in a wireless tag, it is performed by the directions from the management processing section using an interrogator.

#### 0008

Problem(s) to be Solved by the Inventional Although the conventional bidirectional radio communication equipment 1 mentioned above has the function which communicates with other bidirectional radio communication equipments, it does not have the function to perform the communication link with a wireless tag. Moreover, although the interrogator 2 of the conventional RFID system has the function to perform the communication link with the wireless tag 3, it does not have an active bidirectional radio function like a portable telephone, for example.

[0009] Moreover, in the picking system using the conventional RFID system, since bidirectional radio communication equipments, such as wireless LAN, and the interrogator of a RFID system are isolated systems in which both have a source of transmission, equipment becomes large and cost starts.

[0010] From now on, improvement in the speed of mobile radio, such as a portable telephone and Bluetooth, is interlocked with, and the activity of the RFID system in delivery business, mail delivery business, etc. becomes very effective. For this reason, it sets especially to use in a mobile environment, equipment is simplified and miniaturized, and a radio communication equipment which can utilize a RFID system is desired by the low price. Furthermore, a radio communication equipment with which the bidirectional radio function in which a broader—based communication link is also possible, and the function of the interrogator of a RFID system were united is desired. [0011] The purpose of this invention is offering the radio communication equipment with which full-scale bidirectional radio communication equipments, sureless LAN's, a cellular phone's, etc. in a RFID system, were united with the easy configuration, and the radio communications system using this radio communication equipment.

[0012] Moreover, other purposes of this invention are offering the radio communication equipment and radio communications system which perform the communication link with a wireless tag using the sending signal to other radio communication equipments.

0013]

[Méans for Solving the Problem] A bidirectional radio means for this invention to modulate the subcarrier sent from the source of transmission, to transmit to other radio communication equipments from an antenna, and to get over, A signal from other radio communication equipments with an antenna, and to get over, A signal is transmitted for the subcarrier sent from the source of transmission to a wireless tag from an antenna in a modulation or no becoming irregular. It is the radio communication equipment characterized by having the question means which reads the information which receives the signal which answers this signal, becomes irregular based on the information memorized, and is transmitted from a wireless tag with an antenna, gets over, and is memorized by the wireless tag.

[0014] If this invention is followed, a bidirectional radio means can perform the communication link with other radio communication equipments, and a question means can perform the communication link with a wireless tag. Therefore, it is not necessary to use for the communication link with other radio communication equipments and a wireless tag like before two equipments which became independent according to the

[0015] Moreover, this invention is characterized by the source of transmission which sends the subcarrier of said bidirectional radio means and the source of transmission which sends the subcarrier of a question means being common.

[0016] If this invention is followed, since the source of transmission of a bidirectional radio means and the source of transmission of an interrogator will be communalized and the communication link with other radio communication equipments and the communication link with a wireless tag will be performed using the subcarrier made to send from one source of transmission, simplification and a miniaturization of equipment can be attained and reduction of a manufacturing cost can be aimed at. [0017] Moreover, this invention is characterized by the antenna of said bidirectional radio means and the antenna of said question means being common.

[0018] If this invention is followed, one antenna will perform the communication link with other radio communication equipments and a wireless tag. Therefore, simplification and a miniaturization of equipment can be attained and reduction of a manufacturing cost can be aimed at.

[0019] Moreover, as for the antenna of said bidirectional radio means, and the antenna of said question means, this invention is characterized by being prepared separately, respectively.

[0020] If this invention is followed, since it will have two antennas of the antenna which performs bidirectional radio with other radio communication equipments, and

the antenna which performs the communication link with a wireless tag, each communication link can be performed using the antenna which fitted the communication link with other radio communication equipments and a wireless tag, respectively.

[0021] Moreover, this invention is characterized by the antenna of said bidirectional radio means and the antenna transmitted to the wireless tag of said question means being common.

[0022] When transmitting a signal to this invention \*\*\*\*\*\* and a wireless tag, the antenna of a bidirectional radio means to perform a wide area communication link can be used, and while it comes out to attain simplification and a miniaturization of equipment, the communication link range of a wireless tag becomes large. Moreover, while performing the communication link to other radio communication equipments, an electric wave can be effectively used by transmitting a wireless tag signal using the sending signal.

[0023] Moreover, this invention is characterized by becoming irregular with the modulation means by which the modulation of the subcarrier of said bidirectional radio means and the modulation of the subcarrier of said question means are common. [0024] If this invention is followed, the signal transmitted to the signal and wireless tag which are transmitted to other radio communication equipments will be modulated with a common modulator. Therefore, simplification and a miniaturization of equipment can be attained.

[0025] Moreover, this invention is characterized by getting over with the recovery means by which the recovery of the signal transmitted from other radio communication equipments and the recovery of the signal transmitted from a wireless tag are common.

[0026] If this invention is followed, it will restore to the signal received from the reception carried out from other radio communication equipments, and a wireless tag with a common demodulator. Therefore, simplification and a miniaturization of equipment can be attained.

[0027] Moreover, the source of transmission where, as for said bidirectional radio means, this invention sends a subcarrier, A modulation means to modulate the subcarrier sent in said source of transmission, and the bidirectional wireless transceiver antenna which transmits the signal from said modulation means to other radio communication equipments, and receives a signal from other radio communication equipments, it has a recovery means to restore to the signal received from other radio communication equipments. Said question means The wireless tag

transmitting antenna which transmits a signal to a wireless tag using the subcarrier sent in the source of transmission of said bidirectional radio means, it is characterized by having the wireless tag receiving antenna which receives the signal transmitted from a wireless tag, and a wireless tag receiving antenna.

communication equipments, It has a recovery means to restore to the signal received sent in the source of transmission of said bidirectional radio means, It has the wireless tag receiving antenna which receives the signal transmitted from a wireless tag, and is . 0028] If this invention is followed, a question means will transmit a signal to a wireless transmitting antenna and a wireless tag receiving antenna, and a wireless tag recovery means. Therefore, bidirectional radio and the communication link with a wireless tag transceiver antenna which transmits the signal from said modulation means to other means. Therefore, simplification and a miniaturization of equipment can be attained. from other radio communication equipments. Said question means The wireless tag transmitting antenna which transmits a signal to a wireless tag using the subcarrier can be performed only by equipping a bidirectional radio means with a wireless tag tag using the subcarrier sent in the source of transmission of a bidirectional radio 0029] Moreover, the source of transmission where, as for said bidirectional radio characterized by restoring to the signal transmitted from a wireless tag with the means, this invention sends a subcarrier, A modulation means to modulate the subcarrier sent in said source of transmission, and the bidirectional wireless radio communication equipments, and receives a signal from other radio recovery means of said bidirectional radio means.

[0030] If this invention is followed, a question means will restore to the signal which transmits a signal to a wireless tag using the subcarrier sent with a bidirectional radio means, and is transmitted from a wireless tag with the demodulator of a bidirectional radio means. Bidirectional radio and the communication link with a wireless tag can be performed only by equipping a bidirectional radio means with a wireless tag transmitting antenna and a wireless tag receiving antenna by offering the multifunctional demodulator with which a bidirectional radio means can restore also to the signal transmitted from a wireless tag. Therefore, simplification and a miniaturization of equipment can be attained.

[0031] Moreover, this invention is characterized by having the signal coupler which combines alternatively with a demodulator the signal transmitted from the signal or wireless tag transmitted from other radio communication equipments.

[0032] If this invention is followed, since the signal transmitted by the signal coupler

from other radio communication equipments and the signal transmitted from a wireless tag will be alternatively combined with a demodulator, said two signals are not inputted into one demodulator at coincidence. Therefore, it is possible to restore to said two signals with one demodulator.

[0033] Moreover, this invention is characterized by the bidirectional wireless transceiver antenna of said bidirectional radio means and the wireless tag transmitting

antenna of a question means being common antennas.

[0034] If this invention is followed, since the same antenna as the communication link with other radio communication equipments and transmission of the signal to a wireless tag will be used, simplification and a miniaturization of equipment can be attained. When transmitting a signal to a wireless tag, the antenna of a bidirectional radio means to perform a wide area communication link can be used, and the communication link range of a wireless tag becomes large.

[0035] Moreover, this invention is characterized by having the signal eliminator which sends the signal transmitted from the wireless tag which received the signal from the source of transmission with delivery and an antenna at the antenna to a recovery means to restore to this signal.

[0036] If this invention is followed, since the signal to a wireless tag to transmit and the signal received from a wireless tag are separable with a signal eliminator, the signal from transmission and the wireless tag of a signal is receivable to a wireless tag with the same antenna.

[0037] Moreover, this invention is characterized by forming the

transmission-and-reception eliminator which separates the sending signal to other radio communication equipments, and the input signal from other radio communication equipments.

[0038] If this invention is followed, since it will have transmission-and-reception eliminators, such as a diplexer and a switch, for example, a TDD (Time Division Duplex) method and a FDD (Frequency DivisionDuplex) method can perform bidirectional radio with other radio communication equipments.

[0039] Moreover, this invention is characterized by restoring to the signal transmitted from a wireless tag using a part of subcarrier sent in the source of transmission. [0040] If this invention is followed, since it will restore to the signal which takes out a part of subcarrier sent in the source of transmission, for example using the signal distribution box etc., and is transmitted from a wireless tag using this subcarrier, a synchronous detection can be performed even if it does not independently make the source of dispatch for a synchronous detection.

[0041] Moreover, said source of transmission is established for this invention in a bidirectional radio means, and said bidirectional radio means is characterized by having the antenna which transmits a signal to a wireless tag.

[0042] If this invention is followed, a bidirectional radio means has a source of transmission, it transmission, and even if a question means does not have a source of transmission, it can receive the information on a wireless tag by carrying out wireless tag transmission of the signal sent from the source of transmission of said bidirectional radio means from an antenna. Furthermore, transmission of the signal to a wireless tag and transmission, such as data to other radio communication equipments, can be operated to coincidence with one sending-signal energy.

[0043] Moreover, this invention is characterized by being carried out by the antenna with common transmission and reception of the signal to other radio communication equipments which a bidirectional radio means performs and transmission of the signal to a wireless tag.

[0044] If this invention is followed, since the communication link with other radio means of a bidirectional radio means and the signal to a wireless tag will be transmitted with the same antenna, simplification and a miniaturization of equipment can be attained.

[0045] Moreover, this invention is characterized by being carried out by the antenna with separate transmission and reception of the signal to other radio communication equipments which a bidirectional radio means performs and transmission of the signal to a wireless tag.

[0046] If this invention is followed, since an antenna with separate transmission and reception of the signal to other radio communication equipments and reception of the signal to a wireless tag will perform, the antenna suitable for a communication link can be used for each.

[0047] Moreover, this invention is characterized by equipping a question means with the antenna which receives the signal transmitted from the signal and bidirectional radio means which were modulated based on information with the wireless tag. [0048] If this invention is followed, since the same antenna will receive the signal from a wireless tag, and the signal from a bidirectional radio means and it will restore to a

signal, simplification and a miniaturization of equipment can be attained.

[0049] Moreover, this invention is characterized by equipping a question means with the antenna which receives the signal modulated based on information with the wireless tag, and the antenna which receives the signal transmitted from the bidirectional radio means separately.

[0050] If this invention is followed, since a question means receives the signal from a wireless tag, and the signal from a bidirectional radio means with a separate antenna, using the antenna suitable for reception of each signal, it can receive a signal and it can be restored to it.

Moreover, the source of transmission where, as for said bidirectional radio means, this invention sends a subcarrier, A modulation means to modulate the subcarrier sent in said source of transmission, and the bidirectional transceiver antenna which transmits the signal from said modulation means to other radio communication equipments, and receives a signal from other radio communication equipments, and receives a signal from other radio communication equipments. Said question means It is characterized by having the recovery means which carries out the mixed recovery of the signal received with the bidirectional wireless receiving antenna which receives the signal transmitted from the bidirectional transceiver antenna of said bidirectional radio means, the wireless tag receiving antennas which receive the signal transmitted from a wireless tag, and these

[0052] If this invention follows, since the recovery means of the signal which receives the signal transmitted from the antenna of a bidirectional radio means with a bidirectional wireless receiving antenna, receives the signal transmitted from a wireless tag with a wireless tag receiving antenna, and is transmitted from a bidirectional radio means, and the signal which are transmitted from a wireless tag will mix and carry out, even if a question means is not equipped with the source of transmission, it can perform the synchronous detection of the signal transmitted from a wireless tag.

[0053] Moreover, this invention is characterized by the bidirectional wireless receiving antenna and wireless tag receiving antenna of said question means being common. [0054] If this invention is followed, since the same antenna will receive the signal transmitted from the bidirectional radio means of a question means, and the signal transmitted from a wireless tag, simplification and a miniaturization of equipment can be attained.

[0055] Moreover, this invention is a radio communications system characterized by consisting of said radio communication equipment and a wireless tag.

[0056] If this invention is followed, since the radio communications system which consists of said radio communication equipment and wireless tag can be constituted, information can be immediately transmitted to the management equipment which manages the information on a wireless tag for the information received from the

wireless tag with the question means with a bidirectional radio means, for example. Moreover, since a radio communication equipment performs the communication link with other radio communication equipments and a wireless tag by wireless, it does not have constraint of installation etc.

[0057] Moreover, it is characterized by the ability of a radio communication equipment for this invention to write information in said wireless tag, and write information in a wireless tag on radio.

[0058] If this invention is followed, information can be written in a wireless tag with said radio communication equipment. Information can be transmitted to a radio communication equipment from the management equipment which follows, for example, manages the information on a wireless tag, information can be transmitted to a wireless tag from a radio communication equipment, the information on a wireless tag can be written in, and a wireless tag can be managed exactly.

#### [0029]

[Embodiment of the Invention] <u>Drawing 1</u> is drawing showing the radio structure of a system containing the radio communication equipment 4 which is one gestalt of operation of this invention. The radio communications system shown in <u>drawing 1</u> consists of other radio communication equipments 19 with which the wireless tag 3 and radio communication equipment 4 other than a radio communication equipment 4 perform bidirectional radio. In addition, since the wireless tag 3 and other radio communication equipments 19 which are shown in <u>drawing 14</u> and <u>drawing 15</u>, they attach the same sign and omit the explanation. Moreover, the radio communications system of each operation gestalt of not only this operation gestalt but this invention is constituted including said wireless tag 3 and other radio communication equipments 19. The wireless tag 3 can write information in memory by wireless.

[0060] A radio communication equipment 4 can be used as an interrogator in which the communication link with the wireless tag 3 is possible while consisting of a bidirectional radio means to perform bidirectional radio with other radio communication equipments 19, and a question means to perform the communication link with the wireless tag 3 and being able to use as the wireless LAN in which bidirectional radio is possible, or a portable telephone. A radio communication equipment 4 transmits a signal to the source 40 of transmission, a signal distribution box 41, a modulator 42, the transmitting RF section 43, the signal eliminator 44, the transmission-and-reception eliminator 45, and other radio communication equipments

subcarrier The subcarrier sent in the source 40 of transmission which sends, and the section 43 which consists of the modulator 42 and filter which are a modulation means receives the signal transmitted from the wireless tag 3 It is constituted including the 19. The bidirectional wireless transceiver antenna which receives a signal from other common antenna 46 which separate the signal transmitted from the transmitting RF ransceiver common antenna 46, the receiving RF section 47, a demodulator 48, the equipments 19, and a modulator 42, and a demodulator 48 It is constituted including communication equipments 19, and other radio communication equipments 19, The inputs the information for modulating a subcarrier with the receiving RF section 47 ransmits a signal to the wireless tag 3, As a wireless tag receiving antenna which information to which it restored with the information signal input section 50 which unctioning bidirectional wireless transmission and reception and the wireless tag adio communication equipments 19, The wireless tag transmitting antenna which wireless tag demodulator 49, the information signal input section 50, the recovery bidirectional wireless transmission and reception and the wireless tag transceiver which consists of a filter, amplifier, etc., the demodulator 48 which is a recovery [0061] The bidirectional radio means of a radio communication equipment 4 A source 40 of transmission The transmission-and-reception eliminator 45, the neans to restore to the signal transmitted from other radio communication to become irregular, amplifier, etc., the signal transmitted to other radio signal output part 51, and the tag recovery signal output part 52. the outputting recovery signal output part 51.

[0062] The question means of a radio communication equipment 4 consists of the transmitting RF section 43 and circulator which consist of a signal distribution box 41 which takes out the subcarrier sent in the source 40 of transmission, a modulator 42 which modulates the subcarrier sent in the source 40 of transmission, a filter, amplifier, etc., a coupler, etc. The signal transmitted to the wireless tag 3, and the signal transmitted from the wireless tag 3 With the wireless tag demodulator 49 and modulator 42 which are a wireless tag recovery means to restore to the signal transmitted from the receiving RF section 47 which consists of the signal eliminator 44 to separate, the transmission—and—reception eliminator 45, bidirectional wireless transmission and reception eliminator 45, bidirectional wireless transmission and a wireless tag transceiver common antenna 46, a filter, amplifier, etc., and the wireless tag 3, a subcarrier It is constituted including the information signal input section 50 which inputs the information for becoming irregular, and the tag recovery signal output part 52 which outputs the signal to which it restored with the

wireless tag demodulator 48.

[0064] When performing the FURIKEN C hopping which communicates while it may be it may have the frequency adjustable function to change the frequency which sends in 40 of transmission of a radio communication equipment 4 may be constituted so that the source 40 of transmission. Moreover, in <u>drawing 1</u>, when a switch is used for the modulator 42, the information signal input section 50, and transmitting RF section 43 fixed and a frequency is changed, the frequency of the subcarrier sent in the source [0063] With the bidirectional radio means and question means which were mentioned transmission and reception and a wireless tag transceiver common antenna 46, and signal inputted into the control section for changing this switch and the information signal output part 51, and the tag recovery signal output part 52 which process the above, although the source 40 of transmission, a modulator 42, the transmitting RF the information signal input section 50 are share-ized as radical headquarters, a processes the signal outputted from the signal-processing section, the recovery section 43, the transmission-and-reception eliminator 45, bidirectional wireless transmission-and-reception eliminator 45, the signal-processing section which grade may divide according to the signal aspect which communicates. signal input section 50 is omitting.

modulating signal modulated with the modulator 42 is transmitted via the transmitting transmission and reception and the wireless tag transceiver common antenna 46, and communication equipments 19, the bidirectional radio means mentioned above is used RF section 43, the signal eliminator 44, and the transmission-and-reception eliminator [0065] Next, actuation of a radio communication equipment 4 is explained. First, the equipments 19. On the other hand, when receiving the signal transmitted from other based on the information inputted from the information signal input section 50. The the signal transmitted from other radio communication equipments 19 passes along communication equipments 19. With this operation gestalt, a switch is used for the subcarrier sent in the source 40 of transmission is modulated with a modulator 42 performed is explained. When performing the communication link with other radio transceiver common antenna 46. This signal is sent to other corresponding radio transmission-and-reception eliminator 45 as using a TDD (Time Division Duplex) case where bidirectional radio with other radio communication equipments 19 is communication link for the communication link with other radio communication 45 from bidirectional wireless transmission and reception and the wireless tag When transmitting a signal to other radio communication equipments 19, the radio communication equipments 19, it is received by bidirectional wireless

the receiving RF section 47 via the transmission-and-reception eliminator (switch) 45 switched to the reception RF 47 side, and restores to it with a demodulator 48. The information signal to which it restored with the demodulator 48 is taken out from the recovery signal output part 51.

[0066] Next, the case (RFID actuation is called hereafter) where a radio communication equipment 4 is operated as an interrogator of a RFID system is explained. When performing the communication link with the wireless tag 3, the question means mentioned above is used. First, the subcarrier sent in the source 40 of transmission is sent out to the wireless tag 3 through a modulator 42, the transmitting RF section 43, the signal eliminator 44, and the

transmission-and-reception eliminator 45 from bidirectional wireless transmission and reception and the wireless tag transceiver common antenna 46. Although the modulator 42 used by the communication link with other radio communication equipments 19 is performing the modulation in the communication link with the wireless tag 3 with this operation gestalt, when a difference is in the communication mode of other radio communication equipments 19 and the wireless tag 3, the more nearly optimal modulator may be formed independently. Moreover, the transmitting RF section 43 may also be divided into the optimal gestalt. In forming separately the modulator which performs the communication link with the modulator and the wireless tag 3 which are used for the communication link with other radio communication equipments 19, the two information signal input sections 50 are formed, and it inputs an information signal into each modulator.

[0067] When reading the information currently written in the wireless tag 3, the subcarrier sent in the source 40 of transmission is modulated for the read-out command information for reading the information on the wireless tag 3 with no becoming irregular or a modulator 42. It is transmitted from bidirectional wireless transmission and reception and the wireless tag transceiver common antenna 46, and this signal is received by the wireless tag 3. With the wireless tag 3, after receiving the signal transmitted from a radio communication equipment 4, it becomes irregular and transmits by the are recording information which this wireless tag 3 has. It is received by bidirectional wireless transmission and reception and the wireless tag 3 has. It is received by the transmission—and-reception eliminator 45. In RFID actuation, it is fixed to the signal eliminator 44, i.e., transmitting system with modulator 42, side, and the switch which is the transmission—and-reception eliminator 8 is performed in the state of the switch in the time of transmission of \*\* or the bidirectional radio mentioned above. It

is also possible to perform RFID actuation by this configuration at the time of transmission to other radio communication equipments 19.

[0068] The signal turned up and transmitted from the wireless tag 3 is sent to the wireless tag demodulator 49, after being separated by the signal eliminator 44. The wireless tag demodulator 49 is a demodulator of the synchronous-detection mold which restores to the signal which inputs a part of subcarrier from the source 40 of transmission taken out by the signal distribution box 41, and is transmitted from the wireless tag 3. Moreover, what arranges and took out the signal distribution box 41 to the output side of a modulator 42 may be used for the signal used for a synchronous detection with the wireless tag demodulator 49. Moreover, although the wireless tag demodulator 49 may be an independent demodulator. The signal to which it restored in the wireless tag recovery section 49 is taken out from the tag recovery signal output part 52.

perform the communication link with other radio communication equipments 19. Thus, by using each part in common, simplification and a miniaturization of equipment can be when for example, a bidirectional radio means is used as the base and it constitutes a [0069] As mentioned above, in the radio communication equipment 4 of this operation gestalt, the source 40 of transmission, the transmission-and-reception eliminator 45, attained and a manufacturing cost is also held down. Moreover, what is necessary is communication link with the wireless tag 3 with the easy configuration which equips transmission-and-reception eliminator 45 was considered as the switch. Moreover, communication link with the bidirectional radio means and the wireless tag 3 which and bidirectional wireless transmission and reception and wireless tag transceiver radios 4 of this operation gestalt, as what performs a TDD (Time Division Duplex) just to use a diplexer as a transmission-and-reception eliminator in the wireless common antenna 46 grade are share-ized with a question means to perform the radio communication equipment 4, it becomes possible to perform not only the this bidirectional radio means with the signal eliminator 44, the wireless tag communication link with other radio communication equipments 19 but the communication link, in performing a FDD communication link although the demodulator 49, and the tag recovery signal output part 52.

[0070] <u>Drawing 2</u> is drawing showing the radio structure of a system containing the radio communication equipment 5 which are other operation gestalten of this invention. With the radio communication equipment 5 shown in <u>drawing 2</u>, the same sign is given to the part which overlaps the radio communication equipment 4 of said

operation gestalt shown in <u>drawing 1</u>, and the explanation is omitted. Although a radio communication equipment 5 is the almost same configuration as the radio communication equipment 4 of said operation gestalt and is not equipped with a signal eliminator, it is equipped with the wireless tag receiving antenna 53 which receives the signal further transmitted from the wireless tag 3.

[0071] A radio communication equipment 5 can be used as an interrogator in which the communication link with the wireless tag 3 is possible while consisting of a bidirectional radio means to perform bidirectional radio with other radio communication equipments 19, and a question means to perform the communication link with the wireless tag 3 and being able to use as the wireless LAN in which bidirectional radio is possible, or a portable telephone.

transmitting common antenna 76, the wireless tag receiving antenna 53 that receives simplification and a miniaturization of equipment can be attained and a manufacturing section 47, a demodulator 48, the information signal input section 50, and the recovery transmission-and-reception eliminator 45, and other radio communication equipments transmitting antenna which transmits a signal to the wireless tag 3, the receiving RF share-ized in a bidirectional radio means and a question means. A modulator 42, the ransmitting RF section 43, the transmission-and-reception eliminator 45 as well as means of a radio communication equipment 5 transmits a signal to the source 40 of he signal transmitted from the wireless tag 3, the wireless tag demodulator 49, the constituted including the bidirectional wireless transmission and reception and the [0072] The bidirectional wireless transceiver antenna which the bidirectional radio constituted including the source 40 of transmission, a signal distribution box 41, a eliminator 45, bidirectional wireless transmission and reception and a wireless tag eliminator 45, bidirectional wireless transmission and reception and a wireless tag communication mode of a both-hands stage. Thus, by using each part in common, [0073] In the radio communication equipment 5, the source 40 of transmission, a ransmitting common antenna 76, and the information signal input section 50 are wireless tag transmitting common antenna 76 which functions as a wireless tag the radio communication equipment 4 of drawing 1, etc. may be divided by the modulator 42, the transmitting RF section 43, the transmission-and-reception information signal input section 50, and the tag recovery signal output part 52. modulator 42, the transmitting RF section 43, the transmission-and-reception 19, and receives a signal from other radio communication equipments 19, It is signal output part 51. Moreover, the question means of the radio means 5 is ransmission, a modulator 42, the transmitting RF section 43, the

cost is also held down.

in the wireless tag 3, the subcarrier sent in the source 40 of transmission is modulated wireless tag receiving antenna 53, and the signal transmitted from the wireless tag 3 is question means mentioned above is used for the communication link with the wireless for the read-out command information for reading the information on the wireless tag 3 with no becoming irregular or a modulator 42. It is transmitted from the bidirectional out by the are recording information which this wireless tag 3 has. It is received by the inputs a part of subcarrier from the source 40 of transmission taken out by the signal the bidirectional wireless transmission and reception and the wireless tag transmitting transmitted from a radio communication equipment 5, it becomes irregular and sends [0076] As mentioned above, a radio communication equipment 5 is equipped with the transmitting common antenna 76. The sending signal to the wireless tag 3 can perform [0077] <u>Drawing 3</u> (a) is drawing showing the radio structure of a system containing the invention. With the radio communication equipment 6 shown in drawing 3 (a), the same 0075] RFID actuation of a radio communication equipment 5 is explained below. The eliminator 45 from bidirectional wireless transmission and reception and the wireless tag transmitting common antenna 76. When reading the information currently written antenna 76 which has a role of a wireless tag transmitting antenna, and this signal is the communication link with the wireless tag 3 more efficiently by transmitting using communication link with the wireless tag 3, and receiving the signal from the wireless sign is given to the part which overlaps the radio communication equipment 4 of said sent to the wireless tag recovery section 49. The wireless tag recovery section 49 wireless tag receiving antenna 53 which receives the signal from the wireless tag 3 equipments 19 is the same as that of the radio communication equipment 4 of said modulator 42, the transmitting RF section 43, and the transmission-and-reception radio communication equipment 6 of the operation gestalt of further others of this tag 3. The subcarrier sent in the source 40 of transmission is sent out through a other than bidirectional wireless transmission and reception and the wireless tag received by the wireless tag 3. With the wireless tag 3, after receiving the signal distribution box 41, and restores to the signal received from the wireless tag 3. operation gestalt in a radio communication equipment 5, explanation is omitted. wireless transmission and reception and the wireless tag transmitting common common antenna 76 which performs a communication link wide range than the [0074] Since communication link actuation with other radio communication communication link with other radio communication equipments, i.e., the tag 3 using the directive high wireless tag receiving antenna 53.

operation gestalt or radio communication equipment 5 shown in <u>drawing 1</u> or <u>drawing 2</u>, and the explanation is omitted. The radio communication equipment 6 of this operation gestalt is the almost same configuration as the radio communication equipment 4 of said operation gestalt, and is equipped with the antenna transfer switch 55 which switches the bidirectional wireless transceiver antenna 86 and the wireless tag transceiver antenna 54 by the communication link with the wireless tag transceiver antenna 54 which receives the signal from sending out and the wireless tag 3 for a signal to the wireless tag 3, and other radio communication equipments 19 or the wireless tag 3.

[0078] A radio communication equipment 6 can be used as an interrogator in which the communication link with the wireless tag 3 is possible while consisting of a bidirectional radio means to perform bidirectional radio with other radio communication equipments 19, and a question means to perform the communication link with the wireless tag 3 and being able to use as the wireless LAN in which bidirectional radio is possible, or a portable telephone.

6079] The bidirectional radio means of a radio communication equipment 6 transmits a signal to the source 40 of transmission, a modulator 42, the transmitting RF section 43, the antenna changeover switch 55, the transmission–and-reception eliminator 45, and other radio communication equipments 19, and consists of other radio communication equipments 19 including the bidirectional wireless transceiver antenna 86 and the receiving RF section 47 which receive a signal, the recovery section 48, the information signal input section 50, and the recovery signal output part 51. Moreover, the question means of a radio communication equipment 6 is constituted including the wireless tag transceiver antenna 54 which has the function of a wireless tag receiving antenna receive the signal transmitted from the wireless tag transmitting antenna and the wireless tag 3 which transmit a signal to the source 40 of transmission, a signal distribution box 41, a modulator 42, the transmitting RF section 43, the signal eliminator 44, the antenna changeover switch 55, and the wireless tag 3, the wireless tag demodulator 49, the information signal input section 50, and the tag recovery signal output part 52.

[0080] With the bidirectional radio means and question means which were mentioned above, the source 40 of transmission, the antenna changeover switch 55, etc. are share-ized further. Thus, with a bidirectional radio means and a question means, by using each part in common, simplification and a miniaturization of equipment can be attained and reduction of a manufacturing cost can be aimed at.

[0081] Communication link actuation with other radio communication equipments 19

of a radio communication equipment 6 is in the condition which switched the antenna transfer switch 55 to the bidirectional wireless transceiver antenna 86 side, and since it is carried out like the radio communication equipment 4 of said operation gestalt, it omits explanation

question means mentioned above is used for the communication link with the wireless tag 3. The subcarrier sent in the source 40 of transmission passes along the antenna information input section 50. It passes along the antenna changeover switch 55, and is receiving the signal transmitted from a radio communication equipment 6, it becomes irregular and sends out by the are recording information which this wireless tag 3 has. [0082] RFID actuation of a radio communication equipment 6 is explained below. The modulated in inputting the read-out command information for reading the information It is received by the wireless tag transceiver antenna 54, and the signal sent out from written in the wireless tag 3, the subcarrier sent in the source 40 of transmission is transfer switch 55 switched to the modulator 42, transmitting RF section 43, signal eliminator 44, and wireless tag transceiver antenna 54 side, and is transmitted from from a modulator 42 is received by the wireless tag 3. With the wireless tag 3, after taken out by the signal distribution box 41, and restores to the signal received from transmitted from the wireless tag transceiver antenna 54, and the signal outputted eliminator 44, and is sent to the wireless tag recovery section 49. The wireless tag recovery section 49 inputs a part of subcarrier from the source 40 of transmission the wireless tag transceiver antenna 54. When reading the information currently the wireless tag 3 passes along the antenna transfer switch 55 and the signal on the wireless tag 3 with no becoming irregular or a modulator 42 from the the wireless tag 3.

[0083] As mentioned above, a radio communication equipment 6 is equipped with a signal with the wireless tag transceiver antenna 54 which receives the signal from sending out and the wireless tag 3 to the bidirectional wireless transceiver antenna 86 which performs the communication link with other radio communication equipments 19, and the wireless tag 3, by the communication link with other radio communication equipments 19, or the communication link with the wireless tag 3, switches the antenna transfer switch 55 and is considering it as the configuration which uses the bidirectional wireless transceiver antenna 86 and the wireless tag transceiver antenna 54 properly. Therefore, the description of each communication link can be effectively demonstrated by using a separate antenna for the communication link with the communication link with other radio communication equipments 19, and the wireless

[0084] In addition, as shown in the local Fig. of <u>drawing 3</u> (b), in a radio communication equipment 6, the antenna changeover switch 55 and the wireless tag transceiver antenna 54 may be placed between the bidirectional wireless transceiver antenna 86 and the transmission-and-reception part device 45. By this, a radio communication equipment 6 can also perform the communication link with the wireless tag 3, while transmitting to other radio communication equipments 19 depending on communication environment.

[0085] <u>Drawing 4</u> is drawing showing the radio structure of a system containing the radio communication equipment 7 of the operation gestalt of further others of this invention. With the radio communication equipment 7 shown in <u>drawing 4</u>, the same sign is given to the part which overlaps the radio communication equipment 4 of said operation gestalt shown in <u>drawing 1</u>, and the explanation is omitted.

system is used, it can be made to serve a double purpose to both communication links. gestalt, the radio communication equipment 7 of this operation gestalt restores to the signal received in the communication link with other radio communication equipments modulation techniques, such as PSK (Pulse Sift Keying) and QPSK (Quadrature Phase communication equipments 19, and a question means to perform the communication [0086] Although the separate demodulator was used for the communication link with 19 and the wireless tag 3 with one recovery means (multifunctional demodulator 57), Usually, in two-way communication with other radio communication equipments 19, [0087] A radio communication equipment 7 can be used as an interrogator in which demodulator of PSK, a QPSK synchronous-detection method, or a delay detection wireless tag 3 in the radio communication equipments 4, 5, and 6 of said operation Sift Keying), are often used. On the other hand, in the communication link of RFID actuation, modulation techniques, such as simple ASK (Amplitude Sift Keying) or other radio communication equipments 19, and the communication link with the the communication link with the wireless tag 3 is possible while consisting of a link with the wireless tag 3 and being able to use as the wireless LAN in which simple PSK, are used. Therefore, as a multifunctional demodulator 57, if the bidirectional radio means to perform bidirectional radio with other radio bidirectional radio is possible, or a portable telephone.

(0088) The bidirectional radio means of a radio communication equipment 7 is constituted including the signal coupler 56 which combines alternatively with the multifunctional demodulator 57 the signal transmitted from the signal or the wireless tag 3 transmitted from the source 40 of transmission, a modulator 42, the transmitting RF section 43, the transmission—and—reception eliminator 45, bidirectional wireless

transmission and reception and a wireless tag transceiver common antenna 46, and other radio communication equipments 19, the receiving RF section 47, the multifunctional demodulator 57, the information signal input section 50, and the recovery signal output part 51. Moreover, the question means of a radio communication equipment 7 is constituted including the source 40 of transmission, a modulator 42, the transmitting RF section 43, the signal eliminator 44, the transmission—and-reception eliminator 45, bidirectional wireless transmission and reception and a wireless tag transceiver common antenna 46, the signal coupler 56, the receiving RF section 47, the multifunctional demodulator 57, the information signal input section 50, and the recovery signal output part 51.

showed, an antenna changeover switch and a wireless tag transceiver antenna may be and reception and the wireless tag transceiver common antenna 46, and this signal is ppération gestalt in a radio communication equipment 7 where the switch which is the placed between bidirectional wireless transmission and reception and the wireless tag wireless transmission and reception and the wireless tag transceiver common antenna signal eliminator 44. It is separated by the signal eliminator 44, and the signal received signal coupler 56 is connected to the transmission-and-reception eliminator 45 by the 46. When reading the information currently written in the wireless tag 3, the subcarrier communication mode in communication link actuation with other radio communication ransmitted from a radio communication equipment 7, it becomes irregular and sends rregular or a modulator 42. It is transmitted from bidirectional wireless transmission ransceiver common antenna 46, and the transmission-and-reception eliminator 45. equipments 19, explanation is omitted. In addition, as the local Fig. of drawing 3 (b) out by the are recording information which this wireless tag 3 has. It is received by common antenna 46, and the signal sent out from the wireless tag 3 is sent to the bliminator 44, and the transmission-and-reception eliminator 45 from bidirectional nentioned above is used. The subcarrier sent in the source 40 of transmission is idirectional wireless transmission and reception and the wireless tag transceiver eceived by the wireless tag 3. With the wireless tag 3, after receiving the signal 0090] Below, RFID actuation of a communication terminal 7 is explained. When rom the wireless tag 3 passes along the signal coupler 56 and the receiving RF performing the communication link with the wireless tag 3, the question means 0089] Since it is carried out like the radio communication equipment 4 of said transmitted through a modulator 42, the transmitting RF section 43, the signal sent in the source 40 of transmission is modulated for the read-out command information for reading the information on the wireless tag 3 with no becoming

section 47, and restores to them with the multifunctional demodulator 57. In a radio communication equipment 7, although RF switch is used as a signal coupler 56, a circulator, a coupler, etc. may be used. Moreover, the switch which is the transceiver eliminator 45 is fixed to a transmitting system side in RFID actuation. The signal to which it restored with the multifunctional demodulator 57 is taken out from the recovery signal output part 51, and the are recording information on the wireless tag 3 is acquired.

demodulator 57 of the radio communication equipment 7 of said operation gestalt with the operation gestalt of further others of this invention. Drawing 5 is drawing showing With the radio communication equipment 8 shown in <u>drawing 5</u>, the same sign is given switch 59 of a signal. The signal led to the multifunctional demodulator 58 is used as a multifunctional demodulator 58 of a synchronous-detection mold through the source bidirectional radio means and question means of a radio communication equipment 7 as radical headquarters. Therefore, simplification and a miniaturization of equipment [0092] Moreover, it is good also as a multifunctional demodulator 58 which used the operation gestalt shown in drawing 1 and drawing 4, and the explanation is omitted. communication link with other radio communication equipments 19 and the wireless reception and a wireless tag transceiver common antenna 46, the signal coupler 56, the configuration of the radio communication equipment 8 of this operation gestalt. (PhaseLocked Loop) circuit as a demodulator of a synchronous-detection method, communication equipment 8, the subcarrier from the source 40 of transmission is synchronous-detection method of a carrier playback mold for the multifunctional [0093] A radio communication equipment 8 restores to the signal received in the transmission-and-reception eliminator 45, bidirectional wireless transmission and making the dispatch wave which carried out phase simulation to the signal which method of a carrier playback mold. Various approaches, such as an approach of to the part which overlaps the radio communication equipments 4 and 7 of said tag 3 with the multifunctional demodulator 58 using the synchronous-detection ormation, are used. Moreover, when using as an interrogator, the source 40 of and multifunctional demodulator 57 grade are communalized and used for the and performing a synchronous detection, and a method using the Costas loop taken out by the signal distribution box 41, and this signal is \*\*(ed) to the formed the transmitter in the demodulator and was received by the PLL can be attained and reduction of a manufacturing cost can be aimed at transmission is used as a carrier for synchronous detections. In a radio [0091] As mentioned above, the source 40 of transmission, the

carrier for synchronous detections.

[0094] It is good also as a configuration which sends the signal which receives the signal transmitted from the wireless tag 3 without considering as the configuration which sends the signal received from the wireless tag 3 with the operation gestalt of further others of this invention using the signal eliminator 44 like the radio communication equipment 7 of said operation gestalt to the signal coupler 56, which was equipped with wireless tag receiving—antenna 53, and which was received with this wireless tag receiving antenna 53 to the signal coupler 56. <u>Drawing 6</u> is drawing showing the radio structure of a system containing the radio communication equipment 9 of this operation gestalt. With the radio communication equipment 9 shown in <u>drawing 6</u>, the same sign is given to the part which overlaps <u>drawing 2</u>, drawing 4, and the radio communication equipments 5 and 7 of said operation gestalt boiled and shown, and the explanation is omitted.

[0095] A radio communication equipment 9 can be used as an interrogator in which the communication link with the wireless tag 3 is possible while consisting of a bidirectional radio means to perform bidirectional radio with other radio communication equipments 19, and a question means to perform the communication link with the wireless tag 3 and being able to use as the wireless LAN in which bidirectional radio is possible, or a portable telephone.

[0096] The bidirectional radio means of a radio communication equipment 9 is constituted including the source 40 of transmission, a modulator 42, the transmitting RF section 43, the transmission-and-reception eliminator 45, bidirectional wireless transmission and reception and a wireless tag transmitting common antenna 76, the signal coupler 56, the receiving RF section 47, the multifunctional demodulator 57, the information signal input section 50, and the recovery signal output part 51. Moreover, the question means of a radio communication equipment 9 is constituted including the source 40 of transmission, a modulator 42, the transmitting RF section 43, the transceiver separation section 45, the bidirectional wireless transmission and reception and the wireless tag transmitting common antenna 76 that function on the wireless tag 3 as wireless tag transmitting antennas which transmit a signal, the wireless tag receiving antenna 53, the signal coupler 56, the receiving RF section 56, the multifunctional demodulator 57, the information signal input section 50, and the recovery signal output part 51.

[0097] As radical headquarters, the bidirectional radio means and question means of a radio communication equipment 9 share-ize the source 40 of transmission, the transmission-and-reception eliminator 45, bidirectional wireless transmission and

reception and a wireless tag transmitting common antenna 76, the signal coupler 56, and multifunctional demodulator 57 grade, and they are used for them.

means mentioned above. The subcarrier sent in the source 40 of transmission is sent eliminator 45, and bidirectional wireless transmission and reception and a wireless tag restores to it, and the information on the wireless tag 3 is taken out from the recovery iag 3, and receives the signal from the wireless tag 3 using the directive high wireless naving become irregular in part, and results in the wireless tag 3. It is received by the other radio communication equipments, i.e., the communication link with the wireless inputted into bidirectional wireless transmission and reception and the wireless tag configuration / of the transmitting RF section 43]. Communication link actuation with other radio communication equipments 19 does not involve, but since it is the receiving antenna 53 which receives the signal transmitted from the wireless tag 3, transmitting common antenna 76 in no becoming irregular thru/or the condition of signal output part 51. Although a part of signal returned from the wireless tag 3 is same as that of the radio communication equipment 7 of <u>drawing 4</u> , especially the [0098] Since a radio communication equipment 9 is equipped with the wireless tag which performs a communication link wide range than the communication link with transmission and reception and the wireless tag transmitting common antenna 76 he sending signal to the wireless tag 3 transmits using the bidirectional wireless returned from the wireless tag 3 goes into the multifunctional demodulator 57, it [0099] RFID actuation of a radio communication equipment 9 uses the question wireless tag receiving antenna 53, and through the signal coupler 56, the signal transmitting common antenna 76, this does not become a problem by devising tag receiving antenna 53. Thus, the feebleer signal from the wireless tag 3 is out through the transmitting RF section 43, the transmission-and-reception receivable by using the directive high wireless tag receiving antenna 53. wireless tag receiving antenna 53 omits explanation.

[0100] As mentioned above, by using a common part with a bidirectional radio means and a question means, simplification and a miniaturization of equipment can be attained and a manufacturing cost can be reduced.

[0101] It is good also as a multifunctional demodulator 58 which used the synchronous-detection method of a carrier playback mold for the multifunctional demodulator 57 of the radio communication equipment 9 of said operation gestalt with the operation gestalt of further others of this invention. <u>Drawing 7</u> is drawing showing the configuration of the radio communication equipment 10 of this operation gestalt. With the radio communication equipment 10 of this same sign is

transceiver antenna 54 which receives the signal to which a signal is transmitted from given to the part which overlaps the radio communication equipments 8 and 9 of said equipment 11 is the almost same configuration as the radio communication equipment ? of said operation gestalt, and is equipped with the signal coupler 60 which switches same sign is given to the part which overlaps the radio communication equipment of radio communication equipment 11 of the operation gestalt of further others of this operation gestalt shown in drawing 5 and drawing 6, and the explanation is omitted. [0102] Drawing 8 is drawing showing the radio structure of a system containing the invention. With the radio communication equipment 11 of this operation gestalt, the transmission and the wireless tag 3, and other radio communication equipments 19 the bidirectional wireless transceiver antenna 86 and the wireless tag transceiver equipments and RFID actuation are the same as that of the radio communication antenna 54 to the wireless tag 3 by the communication link with the wireless tag equipment 7 of said operation gestalt fundamentally, the explanation is omitted. Moreover, since communication link actuation with other radio communication said operation gestalt, and the explanation is omitted. A radio communication and the wireless tag 3.

[0103] A radio communication equipment 11 can be used as an interrogator in which the communication link with the wireless tag 3 is possible while consisting of a bidirectional radio means to perform bidirectional radio with other radio communication equipments 19, and a question means to perform the communication link with the wireless tag 3 and being able to use as the wireless LAN in which bidirectional radio is possible, or a portable telephone.

Constituted including the source 40 of transmission, a modulator 42, the transmitting constituted including the source 40 of transmission, a modulator 42, the transmitting RF section 43, the signal coupler 60, the transmission-and-reception eliminator 45, the bidirectional wireless transceiver antenna 86, the signal coupler 56, the receiving RF section 47, the multifunctional demodulator 57, the information signal input section 50, and the recovery signal output part 51. Moreover, the question means of a radio communication equipment 11 is constituted including the source 40 of transmission, a modulator 42, the transmitting RF section 43, the signal coupler 60, the transmission-and-reception eliminator 44, the wireless tag transceiver antenna 54, the signal coupler 56, the receiving RF section 47, the multifunctional demodulator 57, the information input section 50, and the recovery signal output part 51.

receiving RF section 47, and multifunctional demodulator 57 grade are communalized

and used for the bidirectional radio means and question means of a radio communication equipment 11 as radical headquarters. Simplification and a miniaturization of equipment can be attained by considering as such a configuration, and reduction of a manufacturing cost is possible.

multifunctional demodulator 57 via the signal coupler 56 and the receiving RF section the bidirectional wireless transceiver antenna 86 of an above-mentioned bidirectional 47. Thus, in the case of a communication link, it is switched and used for the antenna transmission-and-reception eliminator 45 side RF switch which are the signal coupler radio means. On the other hand, in RFID actuation, the signal coupler 60 and the signal above-mentioned question means. The subcarrier from the source 40 of transmission 30 (this operation gestalt switch) and the signal coupler 56, and communicates using suitable for each communication link with other radio communication equipments or transmitting RF section 43, the signal coupler 60, and the signal eliminator 44. It is coupler 56 are connected to the signal eliminator 44, and it is performed using an is sent out from the wireless tag transceiver antenna 54 via a modulator 42, the received by the wireless tag transceiver antenna 54, it is separated by the signal [0106] When performing the communication link with other radio communication eliminator 44, and restores to the signal from the wireless tag 3 with the equipments, a radio communication equipment 11 connects to the the wireless tag 3.

[0107] It is good also as a multifunctional demodulator which used the synchronous-detection method of a carrier playback mold for the multifunctional demodulator 57 of the radio communication equipment 11 of said operation gestalt with the operation gestalt of further others of this invention. <u>Drawing 9</u> is drawing showing the configuration of the radio communication equipment 12 of this operation gestalt. With the radio communication equipment 12 of this operation gestalt, the same sign is given to the part which overlaps the radio communication equipment of said operation gestalt, and the explanation is omitted. The radio communication equipment 12 of this operation gestalt restores to the signal received in the communication link with other radio communication equipments and a wireless tag with the multifunctional demodulator 58 using the synchronous-detection method of a carrier playback mold. Since communication link actuation with other radio communication equipments and a wireless tag is fundamentally the same, it abbreviates explanation to the radio communication equipment 11 of said operation

[0108] Drawing 10 is drawing showing the configuration of the communication system

containing the radio communication equipment 13 of the operation gestalt of further others of this invention. The radio communication equipment 13 of this operation gestalt is constituted including the question section 15 which is a question means to perform the communication link with the bidirectional Radio Communications Department 14 and the wireless tag which are the bidirectional radio means which communicates with other radio communication equipments 19.

[0109] Since the bidirectional Radio Communications Department 14 is the same configuration as the conventional bidirectional radio communication equipment 1 shown in <u>drawing 14</u>, it omits the explanation. The bidirectional Radio Communications Department 14 and the question section 15 can also constitute possible [ desorption ].

[0110] <u>Drawing 11</u> is drawing showing the configuration of the question section 15 of a radio communication equipment 13. An interrogator 15 is constituted including the bidirectional wireless receiving antenna 62 which receives directly the signal sent out from the antenna of the bidirectional Radio Communications Department 14, the wireless tag receiving antenna 63 which receives the signal sent out from the wireless tag 3, a demodulator 64, the signal-processing section 65, and the recovery signal output part 66.

[0111] Next, RFID actuation of a radio communication equipment 13 is explained. The bidirectional Radio Communications Department 14 sends a signal from an antenna 24, in order to communicate. Although an antenna 24 is the same antenna as the conventional antenna 24 shown in <u>drawing 14</u>, it transmits the signal to transmission and reception of the signal of 19 with bidirectional radio equipment, transmission of the signal of 19 with bidirectional radio equipment, transmission of the signal of 19 with bidirectional radio equipment, transmission of the signal of 19 with bidirectional radio equipment, transmission of the signal of 19 with bidirectional wireless tag 3 which exists in a certain distance, and is inputted also into the bidirectional wireless receiving antenna 62 of the question section 15 further arranged near an antenna 24 at near at the same time it is emitted towards other radio machines 19. That magnitude is adjusted by the directive design of the bidirectional wireless receiving antenna 63 of the question section 15. For example, with this operation gestalt, the wireless tag receiving antenna 63 is made into a flat antenna with directivity, and is arranged on the side face of the question section 15.

[0112] The signal inputted into the wireless tag 3 is modulated for the information held in the wireless tag 3, and the modulating signal is emitted from the wireless tag 3. It is received by the wireless tag receiving antenna 63 of the question section 15, and the

the bidirectional wireless receiving antenna 62 is it not being necessarily required, and wireless tag 3, and carrying out AM recovery with a demodulator 64, and can also take modulating signal emitted from this wireless tag 3 is inputted into the demodulator 64 which consists of synchronous detectors etc. On the other hand, the signal sent out from the antenna 24 of the bidirectional Radio Communications Department 14 which [0113] Moreover, when it becomes irregular by simple ASK etc. in the wireless tag 3, question section 15. The information to which it restored in the demodulator 64 lets output part 66. The information taken out from the wireless tag 3 is accumulated in demodulator 64, a mixed recovery is carried out with the modulating signal from the received with the bidirectional wireless receiving antenna 62 is also inputted into a the signal-processing machine 65 pass, and is taken out from the recovery signal wireless tag 3, and the modulating signal from the wireless tag 3 restores to the the wireless tag receiving antenna's 63 receiving the modulating signal from the the signal-processing machine 65, or can also be transmitted to other radio communication equipments 19 by the two-way communication section 14. out the information on the wireless tag 3.

antenna may not receive the modulated wave emitted from the signal and the wireless case it is simplified sharply and an interrogator performs the communication link with modulating signal from the wireless tag 3, both phase contrast cannot be set up freely. specific conditions) peculiar to a synchronous detection will produce it. This problem 0114] Thus, in the radio communication equipment 13 of this operation gestalt, since section 15 of said operation gestalt shown in <u>drawing 11</u>, but as shown in <u>drawing 12</u> Therefore, if these signals have a specific reception relation, since a demodulator 65 is a synchronous-detection method, the Nur point (a recovery output is set to 0 on tag 3 from the bidirectional Radio Communications Department 14 like the question the same antenna 67 may receive. In this case, since one antenna 67 receives the bidirectional Radio Communications Department 24, if the wireless tag 3 is read in other radio communication equipments 19, it can use an electric wave effectively. [0115] With the operation gestalt of further others of this invention, a separate information is read in the wireless tag 3 using the signal transmitted from the signal from the bidirectional Radio Communications Department 14, and the JP,7-131403.A. By considering as such a configuration, simplification and a is solvable by using the frequency-hopping method currently indicated by miniaturization of the question section 16 can be attained.

[0116] Moreover, it is good also as a configuration which prepares two antennas for the bidirectional Radio Communications Department 14 of said operation gestalt

shown in <u>drawing 10</u> with the operation gestalt of further others of this invention.

<u>Drawing 13</u> is an enlarged drawing near [ in the bidirectional Radio Communications Department 17 of this operation gestalt ] the antenna. The bidirectional Radio Communications Department 17 as the same configuration as the conventional bidirectional radio communication equipment 1, and only the parts of an antenna differ. The bidirectional Radio Communications Department 17 of this operation gestalt has the antenna changeover switch 69 which switches the wireless tag transmitting antenna 68 which sends a signal to the wireless tag 3 other than the antenna 24 which performs the communication link with other radio communication equipments 19, and an antenna 24 and the wireless tag antenna 68. Communication link sensibility with the wireless tag 3 can be raised to the wireless tag transmitting antenna 68 by using an antenna with high directivity compared with an antenna 24.

[0117] moreover, in the radio communication equipments 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13 of each operation gestalt mentioned above Although only the actuation which reads the information accumulated in the wireless tag 3 in the communication link with the wireless tag 3 is described, write—in actuation of the information on the wireless tag 3 Usually, for example, an ASK modulation can be given to the sending signal of a radio communication equipment as it carries out, and it can realize easily by getting over with the wireless tag 3 etc.

#### [0118]

[Effect of the Invention] According to this invention, the same equipment can perform the communication link with other radio communication equipments, and the communication link with a wireless tag as mentioned above, therefore, the equipment which performs the communication link with other radio communication equipments — compared with the case where both of equipment who perform the communication link with the wireless tag to call are employed separately, simplification and a miniaturization of the configuration of equipment can be attained and equipment can be built more to a low price.

[0119] Furthermore, the wireless tag information which was acquired in the mobile environment of premises, a wide area, etc. by performing the communication link with other radio communication equipments and a wireless tag by wireless in addition to fixed use can be immediately transmitted to the remote information centre which manages the information on this wireless tag, for example, and a wireless tag can also be provided with information from an information centre.

[0120] Moreover, since the communication link with other radio communication equipments and the communication link with a wireless tag can be performed using

the signal made to send from the same source of transmission according to this invention, the configuration of equipment can be simplified and the miniaturization of equipment can be attained. Furthermore, a manufacturing cost can be held down. [0121] Moreover, according to this invention, since one antenna performs the communication link with other radio communication equipments and a wireless tag, equipment can be simplified and the miniaturization of equipment can be attained. Furthermore, a manufacturing cost can be held down.

[0122] Moreover, since it has the antenna which performs two-way communication with other radio communication equipments, and the antenna which receives the signal from a wireless tag according to this invention, it can communicate using the antenna which fitted the communication link with other radio communication equipments and a wireless tag, respectively.

[0123] Moreover, since a signal can be transmitted to a wireless tag with the antenna of a bidirectional radio means to perform a wide area communication link while being able to attain simplification and a miniaturization of equipment, since according to this invention it is common and the antenna which communicates with other radio communication equipments, and the antenna which transmits a signal to a wireless tag are used, the communication link range of a wireless tag becomes large.

[0124] Moreover, since the signal transmitted to the signal and wireless tag which are transmitted to other radio communication equipments depending on a communication mode is modulated with a common modulator according to this invention, simplification and a miniaturization can be attained for equipment. Furthermore, a manufacturing cost can be held down.

[0125] Moreover, since it restores to the signal received from the signal and wireless tag which were received from other radio communication equipments with a common recovery means according to this invention, equipment can be simplified and equipment can be miniaturized. Furthermore, a manufacturing cost can be held down. [0126] Moreover, according to this invention, only by equipping a bidirectional radio means with a wireless tag transmitting antenna and a wireless tag receiving antenna, and a wireless tag recovery means, since bidirectional radio and the communication link with a wireless tag can be performed, other radio communication equipments, and a wireless tag and the radio communication equipment which can be communicated can be constituted easily, and simplification and a miniaturization of equipment can be attained.

[0127] Moreover, according to this invention, since it can carry out to the communication link with other radio communication equipments and a wireless tag

using the almost same components, simplification and a miniaturization of equipment can be attained and a manufacturing cost can be reduced.

[0128] Moreover, since the signal transmitted by the signal coupler from other radio communication equipments and the signal transmitted from a wireless tag are alternatively combined with a demodulator according to this invention, it is possible to restore to said two signals with one demodulator.

[0129] Moreover, according to this invention, since the bidirectional wireless transceiver antenna of a bidirectional radio means and the wireless tag transmitting antenna of a question means are used in common, as occasion demands, it is more wide range and the communication link with a wireless tag can be performed.

[0130] Moreover, according to this invention, the signal transmitted from transmission and the wireless tag of the signal to a wireless tag with one antenna is receivable with a signal eliminator by that which can separate the sending signal and input signal of a wireless tag.

[0131] Moreover, according to this invention, the signal from transmission and other radio communication equipments of the signal to other radio communication equipments is receivable with one antenna with a transmission—and—reception eliminator.

[0132] Moreover, since it restores to the signal transmitted from a wireless tag using the subcarrier sent in the source of transmission according to this invention, it is not necessary to make independently the source of dispatch for performing a synchronous detection.

[0133] Moreover, since it restores to the signal which takes out a part of subcarrier oscillated in the source of transmission, and is transmitted from a wireless tag using this subcarrier according to this invention, it is not necessary to make the source of dispatch for a synchronous detection independently.

[0134] Moreover, according to this invention, even if a question means does not have a source of transmission, it can transmit a signal to a wireless tag from the antenna of a bidirectional radio means, can receive the information from a wireless tag, and can simplify equipment. Furthermore, since the communication link energy scattered about on the occasion of the communication link to other radio communication equipments can be used and the communication link with a wireless tag can be performed, it is useful also to energy saving of an information communication link.

[0135] moreover, the thing for which a common antenna performs transmission of a signal to a wireless tag with transmission and reception of the signal to other radio communication equipments according to this invention — equipment can be

miniaturized and a manufacturing cost can be held down.

- [0136] Moreover, according to this invention, since a separate antenna performs transmission of a signal to a wireless tag, it can communicate with transmission and reception of the signal to other radio communication equipments using the artenna suitable for each communication link.
- [0137] Moreover, according to this invention, since the same antenna receives the signal from a wireless tag, and the signal from a bidirectional radio means, equipment can be simplified and it can miniaturize.
- [0138] Moreover, according to this invention, since a separate antenna receives the signal from a wireless tag, and the signal from a bidirectional radio means, it can communicate using the antenna suitable for each communication link.
- Moreover, even if a question means does not have a source of transmission, when a signal is transmitted to other radio communication equipments from a radio means according to this invention, The signal which a signal is transmitted also to a wireless tag at coincidence, and receives the signal returned from a wireless tag, and is transmitted from a bidirectional radio means is received directly, and since these signals are mixed and it gets over, even if a question means does not have a source of transmission, it can perform the communication link with a wireless tag.
- [0140] Moreover, since a question means receives the signal transmitted from a bidirectional radio means with one antenna, and the signal transmitted from a wireless tag according to this invention, simplification and a miniaturization of equipment can be attained.
- [0141] Moreover, since the radio communications system which consists of said radio communication equipment and wireless tag can be constituted according to this inviention, information can be immediately transmitted to the management equipment which manages the information on a wireless tag for the information received from the wireless tag with the question means with a bidirectional radio means, for example. Moreover, since a radio communication equipment performs the communication link with other radio communication equipments and a wireless tag by wireless, it does not have constraint of installation etc.
- [0142] Moreover, according to this invention, information can be written in a wireless tag with said radio communication equipment. Information can be transmitted to a radio communication equipment from the management equipment which follows, for example, manages the information on a wireless tag, information can be transmitted to a wireless tag from a radio communication equipment, the information on a wireless tag can be written in, and a wireless tag can be managed exactly.

[Translation done.]

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## *FECHNICAL FIELD*

[Field of the Invention] This invention relates to the radio communication equipment and radio communications system which have a RFID function and a bidirectional radio function.

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#### PRIOR ART

[Description of the Prior Art] Conventionally, there is a communication device using wireless. <u>Drawing 14</u> is drawing showing the basic configuration of the common

transmission-and-reception eliminators 23, such as a switch to separate or a diplexer, the antenna 24 which a signal transmits and receives; low noise amplifier, a filter, etc., signal output part 28 which takes out the information signal input section 27 to input, data, etc. Although the signal-processing section which otherwise processes the data eliminator 23 uses a switch or a diplexer properly with TDD (Time Division Duplex) or bidirectional radio are shown in drawing 14 . Other radio communication equipments [0003] The transmitting RF (Radio Frequency) section 22 to which the bidirectional transmit, etc. are required, it omits in drawing 14. The transmission-and-reception the demodulator 26 which restores to the received signal, the data transmitted to bidirectional radio communication equipment 1, the synthesizer control section for modulator 21, power amplification, a filter, etc., and the signal transmitted to other stations where the bidirectional radio communication equipment 1 communicates. radio communication equipment 1 changes from the source 20 of transmission, a other radio communication equipments 19 It is constituted including the recovery changing the frequency of the subcarrier sent in the source 20 of transmission in 19 are other bidirectional radio communication equipments and base transceiver communication equipment 19 The receiving RF section 25 which consists of the inputted into a modulator 21 from the information signal input section 27 in the performing the FURIKEN C hopping which changes the frequency of a signal to AreaNetwork) and a portable telephone. The bidirectional radio communication bidirectional radio communication equipments 1, such as wireless LAN (Local equipment 1 and other radio communication equipments 19 which perform radio communication equipments 19, The signal transmitted from a radio a FDD (Frequency DivisionDuplex) method.

[0004] The bidirectional radio communication equipment 1 of <u>drawing 14</u> explains actuation below as a communication device of a TDD method. The subcarrier sent in the source 20 of transmission of the bidirectional radio communication equipment 1 is modulated with a modulator 21 by the information signal input ted from the information signal input section 27. The modulating signal modulated with the modulator 21 is transmitted toward other radio communication equipments 19 through the transmitting RF section 22 and the transmission-and-reception separation section (switch) 23 from an antenna 24. On the other hand, an antenna 24 receives, it restores to the modulating signal transmitted to the bidirectional radio communication equipment 1 from other radio communication equipments 19 with a demodulator 26 via the transmission-and-reception eliminator 23 and the receiving RF section 25, and an information signal is taken out from the recovery signal output part 28. Actuation of

the above bidirectional radio communication equipment 1 is actuation of general bidirectional radio.

[0005] <u>Drawing 15</u> is drawing showing the interrogator 2 and the wireless tag 3 of a common RFID system. An interrogator 2 is the communication device which used wireless, and is constituted including the demodulator 34 which consists of the signal eliminator 32 which consists of the source 30 of transmission, a modulator 31, a circulator, a directional coupler, etc., an antenna 33, a synchronous detector, etc., the tag information recovery signal output part 35, etc. Although the information signal input section which inputs the transmit data to RF transmitting section, RF receive section, the signal-processing section, and the wireless tag 3 is required for others, it is omitting in <u>drawing 15</u>. The wireless tag 3 is constituted including the memory 39 which records the tag recovery section 38 which restores to the tag antenna 36 which receives the signal from an interrogator 2 and transmits a signal to an interrogator 2, and the signal received with the tag antenna 36, data, etc.

demodulator 34, it is taken out from the tag information recovery signal output part 35. ransmits to the wireless tag 3, and with the wireless tag 3, it restores to the received nformation on memory 39 with the tag modulator 37 of the wireless tag 3. The signal nodulated with the wireless tag 3 is transmitted to an interrogator 2 from the wireless ag 3. An interrogator 2 receives the signal transmitted from the wireless tag 3 with an .0006] Below, actuation of an interrogator 2 and the wireless tag 3 is explained. When eading the information on the wireless tag 3, an interrogator 2 becomes irregular with nodulating signal in the tag recovery section 38, and writes in memory 39. Actuation n writing information in the wireless tag 3, using write-in information, the subcarrier of the above interrogator 2 and the wireless tag 3 is actuation of the RFID system antenna 33. The modulating signal received with the antenna 33 is inputted into a nterrogator 2 is transmitted from an antenna 33 through the signal eliminator 32. eceived by the tag antenna 36 of the wireless tag 3, and the modulating signal modulator 31, and the subcarrier sent in the source 30 of transmission of an sent in the source 30 of transmission with a modulator 31 is modulated, and it demodulator 34 through the signal eliminator 32, and after getting over with a ransmitted from an antenna 33 receives a modulation using the are recording generally known well.

[0007] From the former, the RFID system is utilized in FA (Factory Automation) business etc. In recent years, it is broadly used for the picking system which classifies stock control and an article in the PD or the circulation field by the miniaturization of

a wireless tag, or dc-battery loess-ization. The information on the wireless tag acquired by the interrogator is immediately sent to an access point using bidirectional radio communication equipments, such as wireless LAN prepared apart from the interrogator, and is processed in the management processing section, and the gestaft which manages goods often consists of such PD and the circulation fields. Moreover, also when writing information in a wireless tag, it is performed by the directions from the management processing section using an interrogator.

[Translation done.]

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# **EFFECT OF THE INVENTION**

[Effect of the Invention] According to this invention, the same equipment can perform the communication link with other radio communication equipments, and the communication link with a wireless tag as mentioned above. therefore, the equipment which performs the communication link with other radio communication equipments — compared with the case where both of equipment who perform the communication link with the wireless tag to call are employed separately, simplification and a miniaturization of the configuration of equipment can be attained and equipment can be built more to a low price.

[0119] Furthermore, the wireless tag information which was acquired in the mobile environment of premises, a wide area, etc. by performing the communication link with other radio communication equipments and a wireless tag by wireless in addition to fixed use can be immediately transmitted to the remote information centre which manages the information on this wireless tag, for example, and a wireless tag can also

be provided with information from an information centre.

[0120] Moreover, since the communication link with other radio communication equipments and the communication link with a wireless tag can be performed using the signal made to send from the same source of transmission according to this invention, the configuration of equipment can be simplified and the miniaturization of equipment can be attained. Furthermore, a manufacturing cost can be held down. [0121] Moreover, according to this invention, since one antenna performs the communication link with other radio communication equipments and a wireless tag, equipment can be simplified and the miniaturization of equipment can be attained. Furthermore, a manufacturing cost can be held down.

[0122] Moreover, since it has the antenna which performs two-way communication with other radio communication equipments, and the antenna which receives the signal from a wireless tag according to this invention, it can communicate using the antenna which fitted the communication link with other radio communication equipments and a wireless tag, respectively.

[0123] Moreover, since a signal can be transmitted to a wireless tag with the antenna of a bidirectional radio means to perform a wide area communication link while being able to attain simplification and a miniaturization of equipment, since according to this invention it is common and the antenna which communicates with other radio communication equipments, and the antenna which transmits a signal to a wireless tag are used, the communication link range of a wireless tag becomes large.

[0124] Moreover, since the signal transmitted to the signal and wireless tag which are transmitted to other radio communication equipments depending on a communication mode is modulated with a common modulator according to this invention, simplification and a miniaturization can be attained for equipment. Furthermore, a manufacturing cost can be held down.

[0125] Moreover, since it restores to the signal received from the signal and wireless tag which were received from other radio communication equipments with a common recovery means according to this invention, equipment can be simplified and equipment can be miniaturized. Furthermore, a manufacturing cost can be held down. [0126] Moreover, according to this invention, only by equipping a bidirectional radio means with a wireless tag transmitting antenna and a wireless tag receiving antenna, and a wireless tag recovery means, since bidirectional radio and the communication link with a wireless tag can be performed, other radio communication equipments, and a wireless tag and the radio communication equipment which can be communicated can be constituted easily, and simplification and a miniaturization of equipment can be

attained

[0127] Moreover, according to this invention, since it can carry out to the communication link with other radio communication equipments and a wireless tag using the almost same components, simplification and a miniaturization of equipment can be attained and a manufacturing cost can be reduced.

[0128] Moreover, since the signal transmitted by the signal coupler from other radio communication equipments and the signal transmitted from a wireless tag are alternatively combined with a demodulator according to this invention, it is possible to restore to said two signals with one demodulator.

[0129] Moreover, according to this invention, since the bidirectional wireless transceiver antenna of a bidirectional radio means and the wireless tag transmitting antenna of a question means are used in common, as occasion demands, it is more wide range and the communication link with a wireless tag can be performed. [0130] Moreover, according to this invention, the signal transmitted from transmission and the wireless tag of the signal to a wireless tag with one antenna is receivable with

[0130] Moreover, according to this invention, the signal transmitted from transmission and the wireless tag of the signal to a wireless tag with one antenna is receivable with a signal eliminator by that which can separate the sending signal and input signal of a wireless tag.

[0131] Moreover, according to this invention, the signal from transmission and other radio communication equipments of the signal to other radio communication equipments is receivable with one antenna with a transmission-and-reception eliminator.

[0132] Moreover, since it restores to the signal transmitted from a wireless tag using the subcarrier sent in the source of transmission according to this invention, it is not necessary to make independently the source of dispatch for performing a synchronous detection.

[0133] Moreover, since it restores to the signal which takes out a part of subcarrier oscillated in the source of transmission, and is transmitted from a wireless tag using this subcarrier according to this invention, it is not necessary to make the source of dispatch for a synchronous detection independently.

[0134] Moreover, according to this invention, even if a question means does not have a source of transmission, it can transmit a signal to a wireless tag from the antenna of a bidirectional radio means, can receive the information from a wireless tag, and can simplify equipment. Furthermore, since the communication link energy scattered about on the occasion of the communication link to other radio communication equipments can be used and the communication link with a wireless tag can be performed, it is useful also to energy saving of an information communication link.

[0135] moreover, the thing for which a common antenna performs transmission of a signal to a wireless tag with transmission and reception of the signal to other radio communication equipments according to this invention — equipment can be miniaturized and a manufacturing cost can be held down.

[0136] Moreover, according to this invention, since a separate antenna performs transmission of a signal to a wireless tag, it can communicate with transmission and reception of the signal to other radio communication equipments using the antenna suitable for each communication link.

[0137] Moreover, according to this invention, since the same antenna receives the signal from a wireless tag, and the signal from a bidirectional radio means, equipment can be simplified and it can miniaturize.

[0138] Moreover, according to this invention, since a separate antenna receives the signal from a wireless tag, and the signal from a bidirectional radio means, it can communicate using the antenna suitable for each communication link.

[0139] Moreover, even if a question means does not have a source of transmission, when a signal is transmitted to other radio communication equipments from a radio means according to this invention. The signal which a signal is transmitted also to a wireless tag at coincidence, and receives the signal returned from a wireless tag and is transmitted from a bidirectional radio means is received directly, and since these signals are mixed and it gets over, even if a question means does not have a source of transmission, it can perform the communication link with a wireless tag.

[0140] Moreover, since a question means receives the signal transmitted from a bidirectional radio means with one antenna, and the signal transmitted from a wireless tag according to this invention, simplification and a miniaturization of equipment can be attained.

[0141] Moreover, since the radio communications system which consists of said radio communication equipment and wireless tag can be constituted according to this invention, information can be immediately transmitted to the management equipment which manages the information on a wireless tag for the information received from the wireless tag with the question means with a bidirectional radio means, for example. Moreover, since a radio communication equipment performs the communication link with other radio communication equipments and a wireless tag by wireless, it does not have constraint of installation etc.

[0142] Moreoyer, according to this invention, information can be written in a wireless tag with said radio communication equipment. Information can be transmitted to a radio communication equipment from the management equipment which follows, for

example, manages the information on a wireless tag, information can be transmitted to a wireless tag from a radio communication equipment, the information on a wireless tag can be written in, and a wireless tag can be managed exactly.

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## TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Although the conventional bidirectional radio communication equipment 1 mentioned above has the function which communicates with other bidirectional radio communication equipments, it does not have the function to perform the communication link with a wireless tag. Moreover, although the interrogator 2 of the conventional RFID system has the function to perform the communication link with the wireless tag 3, it does not have an active bidirectional radio function like a portable telephone, for example.

[0009] Moreover, in the picking system using the conventional RFID system, since bidirectional radio communication equipments, such as wireless LAN, and the interrogator of a RFID system are isolated systems in which both have a source of transmission, equipment becomes large and cost starts.

[0010] From now on, improvement in the speed of mobile radio, such as a portable telephone and Bluetooth, is interlocked with, and the activity of the RFID system in delivery business, mail delivery business, etc. becomes very effective. For this reason, it sets especially to use in a mobile environment, equipment is simplified and miniaturized, and a radio communication equipment which can utilize a RFID system is desired by the low price. Furthermore, a radio communication equipment with which

the bidirectional radio function in which a broader-based communication link is also possible, and the function of the interrogator of a RFID system were united is desired. [0011] The purpose of this invention is offering the radio communication equipment with which full-scale bidirectional radio communication equipments', such as an interrogator's, wireless LAN's, a cellular phone's, etc. in a RFID system, were united with the easy configuration, and the radio communications system using this radio communication equipment.

[0012] Moreover, other purposes of this invention are offering the radio communication equipment and radio communications system which perform the communication link with a wireless tag using the sending signal to other radio communication equipments.

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#### MEANS

[Means for Solving the Problem] A bidirectional radio means for this invention to modulate the subcarrier sent from the source of transmission, to transmit to other radio communication equipments from an antenna, to receive the signal from other radio communication equipments with an antenna, and to get over, A signal is transmitted for the subcarrier sent from the source of transmission to a wireless tag from an antenna in a modulation or no becoming irregular. It is the radio communication equipment characterized by having the question means which reads the information which receives the signal which answers this signal, becomes irregular based on the information memorized, and is transmitted from a wireless tag with an

antenna, gets over, and is memorized by the wireless tag.

[0014] If this invention is followed, a bidirectional radio means can perform the communication link with other radio communication equipments, and a question means can perform the communication link with a wireless tag. Therefore, it is not necessary to use for the communication link with other radio communication equipments and a wireless tag like before two equipments which became independent according to the individual

[0015] Moreover, this invention is characterized by the source of transmission which sends the subcarrier of said bidirectional radio means and the source of transmission which sends the subcarrier of a question means being common.

[0016] If this invention is followed, since the source of transmission of a bidirectional radio means and the source of transmission of an interrogator will be communalized and the communication link with other radio communication equipments and the communication link with a wireless tag will be performed using the subcarrier made to send from one source of transmission, simplification and a miniaturization of equipment can be attained and reduction of a manufacturing cost can be aimed at.

[0017] Moreover, this invention is characterized by the antenna of said bidirectional radio means and the antenna of said question means being common.

[0018] If this invention is followed, one antenna will perform the communication link with other radio communication equipments and a wireless tag. Therefore, simplification and a miniaturization of equipment can be attained and reduction of a manufacturing cost can be aimed at.

[0019] Moreover, as for the antenna of said bidirectional radio means, and the antenna of said question means, this invention is characterized by being prepared separately, respectively.

[0020] If this invention is followed, since it will have two antennas of the antenna which performs bidirectional radio with other radio communication equipments, and the antenna which performs the communication link with a wireless tag, each communication link can be performed using the antenna which fitted the communication link with other radio communication equipments and a wireless tag, respectively.

[0021] Moreover, this invention is characterized by the antenna of said bidirectional radio means and the antenna transmitted to the wireless tag of said question means being common.

[0022] When transmitting a signal to this invention \*\*\*\*\*\* and a wireless tag, the antenna of a bidirectional radio means to perform a wide area communication link can

be used, and while it comes out to attain simplification and a miniaturization of equipment, the communication link range of a wireless tag becomes large. Moreover, while performing the communication link to other radio communication equipments, an electric wave can be effectively used by transmitting a wireless tag signal using the sending signal

[0023] Moreover, this invention is characterized by becoming irregular with the modulation means by which the modulation of the subcarrier of said bidirectional radio means and the modulation of the subcarrier of said question means are common. [0024] If this invention is followed, the signal transmitted to the signal and wireless tag which are transmitted to other radio communication equipments will be modulated with a common modulator. Therefore, simplification and a miniaturization of equipment can be attained.

[0025] Moreover, this invention is characterized by getting over with the recovery means by which the recovery of the signal transmitted from other radio communication equipments and the recovery of the signal transmitted from a wireless tag are common.

[0026] If this invention is followed, it will restore to the signal received from the reception carried out from other radio communication equipments, and a wireless tag with a common demodulator. Therefore, simplification and a miniaturization of equipment can be attained.

[0027] Moreover, the source of transmission where, as for said bidirectional radio means, this invertion sends a subcarrier, A modulation means to modulate the subcarrier sent in said source of transmission, and the bidirectional wireless transceiver antenna which transmits the signal from said modulation means to other radio communication equipments, and receives a signal from other radio communication equipments. Said question means The wireless tag from other radio communication equipments. Said question means The wireless tag transmitting antenna which transmits a signal to a wireless tag using the subcarrier sent in the source of transmission of said bidirectional radio means, it is characterized by having the wireless tag receiving antenna which receives the signal transmitted from a wireless tag receiving antenna.

[0028] If this invention is followed, a question means will transmit a signal to a wireless tag using the subcarrier sent in the source of transmission of a bidirectional radio means. Therefore, bidirectional radio and the communication link with a wireless tag can be performed only by equipping a bidirectional radio means with a wireless tag

transmitting antenna and a wireless tag receiving antenna, and a wireless tag recovery means. Therefore, simplification and a miniaturization of equipment can be attained. [0029] Moreover, the source of transmission where, as for said bidirectional radio means, this invention sends a subcarrier, A modulation means to modulate the subcarrier sent in said source of transmission, and the bidirectional wireless transceiver antenna which transmits the signal from said modulation means to other radio communication equipments, and receives a signal from other radio communication equipments. Raid question means The wireless tag transmitting antenna which transmits a signal to a wireless tag using the subcarrier sent in the source of transmission of said bidirectional radio means, it has the wireless tag receiving antenna which receives the signal transmitted from a wireless tag with the recovery means of said bidirectional radio means.

[0030] If this invention is followed, a question means will restore to the signal which transmits a signal to a wireless tag using the subcarrier sent with a bidirectional radio means, and is transmitted from a wireless tag with the demodulator of a bidirectional radio means. Bidirectional radio and the communication link with a wireless tag can be performed only by equipping a bidirectional radio means with a wireless tag transmitting antenna and a wireless tag receiving antenna by offering the multifunctional demodulator with which a bidirectional radio means can restore also to the signal transmitted from a wireless tag. Therefore, simplification and a miniaturization of equipment can be attained.

[0031] Moreover, this invention is characterized by having the signal coupler which combines alternatively with a demodulator the signal transmitted from the signal or wireless tag transmitted from other radio communication equipments.
[0032] If this invention is followed, since the signal transmitted by the signal coupler from other radio communication equipments and the signal transmitted from a wireless tag will be alternatively combined with a demodulator, said two signals are not

[0033] Moreover, this invention is characterized by the bidirectional wireless transceiver antenna of said bidirectional radio means and the wireless tag transmitting antenna of a question means being common antennas.

inputted into one demodulator at coincidence. Therefore, it is possible to restore to

said two signals with one demodulator.

[0034] If this invention is followed, since the same antenna as the communication link with other radio communication equipments and transmission of the signal to a

wireless tag will be used, simplification and a miniaturization of equipment can be attained. When transmitting a signal to a wireless tag, the antenna of a bidirectional radio means to perform a wide area communication link can be used, and the communication link range of a wireless tag becomes large.

[0035] Moreover, this invention is characterized by having the signal eliminator which sends the signal transmitted from the wireless tag which received the signal from the source of transmission with delivery and an antenna at the antenna to a recovery means to restore to this signal.

[0036] If this invention is followed, since the signal to a wireless tag to transmit and the signal received from a wireless tag are separable with a signal eliminator, the signal from transmission and the wireless tag of a signal is receivable to a wireless tag with the same antenna.

[0037] Moreover, this invention is characterized by forming the

transmission—and-reception eliminator which separates the sending signal to other radio communication equipments, and the input signal from other radio communication equipments.

[0038] If this invention is followed, since it will have transmission-and-reception eliminators, such as a diplexer and a switch, for example, a TDD (Time Division Duplex) method and a FDD (Frequency DivisionDuplex) method can perform bidirectional radio with other radio communication equipments.

[0039] Moreover, this invention is characterized by restoring to the signal transmitted from a wireless tag using a part of subcarrier sent in the source of transmission.

[0040] If this invention is followed, since it will restore to the signal which takes out a part of subcarrier sent in the source of transmission, for example using the signal distribution box etc., and is transmitted from a wireless tag using this subcarrier, a synchronous detection can be performed even if it does not independently make the source of dispatch for a synchronous detection.

[0041] Moreover, said source of transmission is established for this invention in a bidirectional radio means, and said bidirectional radio means is characterized by having the antenna which transmits a signal to a wireless tag.

[0042] If this invention is followed, a bidirectional radio means has a source of transmission, and even if a question means does not have a source of transmission, it can receive the information on a wireless tag by carrying out wireless tag transmission of the signal sent from the source of transmission of said bidirectional radio means from an antenna. Furthermore, transmission of the signal to a wireless tag and transmission, such as data to other radio communication equipments, can be operated

to coincidence with one sending-signal energy.

[0043] Moreover, this invention is characterized by being carried out by the antenna with common transmission and reception of the signal to other radio communication equipments which a bidirectional radio means performs and transmission of the signal to a wireless tag.

[0044] If this invention is followed, since the communication link with other radio means of a bidirectional radio means and the signal to a wireless tag will be transmitted with the same antenna, simplification and a miniaturization of equipment can be attained.

[0045] Moreover, this invention is characterized by being carried out by the antenna with separate transmission and reception of the signal to other radio communication equipments which a bidirectional radio means performs and transmission of the signal to a wireless tag.

[0046] If this invention is followed, since an antenna with separate transmission and reception of the signal to other radio communication equipments and reception of the signal to a wireless tag will perform, the antenna suitable for a communication link can be used for each.

[0047] Moreover, this invention is characterized by equipping a question means with the antenna which receives the signal transmitted from the signal and bidirectional radio means which were modulated based on information with the wireless tag.
[0048] If this invention is followed, since the same antenna will receive the signal from a wireless tag, and the signal from a bidirectional radio means and it will restore to a signal, simplification and a miniaturization of equipment can be attained.
[0049] Moreover, this invention is characterized by equipping a question means with the antenna which receives the signal modulated based on information with the wireless tag, and the antenna which receives the signal transmitted from the bidirectional radio means separately.

[0050] If this invention is followed, since a question means receives the signal from a wireless tag, and the signal from a bidirectional radio means with a separate antenna, using the antenna suitable for reception of each signal, it can receive a signal and it can be restored to it.

[0051] Moreover, the source of transmission where, as for said bidirectional radio means, this invertion sends a subcarrier, A modulation means to modulate the subcarrier sent in said source of transmission, and the bidirectional transceiver antenna which transmits the signal from said modulation means to other radio communication equipments, and receives a signal from other radio communication

equipments, It has a recovery means to restore to the signal received from other radio communication equipments. Said question means It is characterized by having the recovery means which carries out the mixed recovery of the signal received with the bidirectional wireless receiving antenna which receives the signal transmitted from the bidirectional transceiver antenna of said bidirectional radio means, the wireless tag receiving antennas which receive the signal transmitted from a wireless tag, and these antennas.

[0052] If this invention follows, since the recovery means of the signal which receives the signal transmitted from the antenna of a bidirectional radio means with a bidirectional wireless receiving antenna, receives the signal transmitted from a wireless tag with a wireless tag receiving antenna, and is transmitted from a bidirectional radio means, and the signal which are transmitted from a wireless tag will mix and carry out, even if a question means is not equipped with the source of transmission, it can perform the synchronous detection of the signal transmitted from a wireless tag.

[0053] Moreover, this invention is characterized by the bidirectional wireless receiving antenna and wireless tag receiving antenna of said question means being common. [0054] If this invention is followed, since the same antenna will receive the signal transmitted from the bidirectional radio means of a question means, and the signal transmitted from a wireless tag, simplification and a miniaturization of equipment can be attained.

[0055] Moreover, this invention is a radio communications system characterized by consisting of said radio communication equipment and a wireless tag.

[0056] If this invention is followed, since the radio communications system which consists of said radio communication equipment and wireless tag can be constituted, information can be immediately transmitted to the management equipment which manages the information on a wireless tag for the information received from the wireless tag with the question means with a bidirectional radio means, for example. Moreover, since a radio communication equipment performs the communication link with other radio communication equipments and a wireless tag by wireless, it does not have constraint of installation etc.

[0057] Moreover, it is characterized by the ability of a radio communication equipment for this invention to write information in said wireless tag, and write information in a wireless tag on radio.

[0058] If this invention is followed, information can be written in a wireless tag with said radio communication equipment. Information can be transmitted to a radio

communication equipment from the management equipment which follows, for example, manages the information on a wireless tag, information can be transmitted to a wireless tag from a radio communication equipment, the information on a wireless tag can be written in, and a wireless tag can be managed exactly.

[0059]

[Embodiment of the Invention] <u>Drawing I</u> is drawing showing the radio structure of a system containing the radio communication equipment 4 which is one gestalt of operation of this invention. The radio communications system shown in <u>drawing 1</u> consists of other radio communication equipments 19 with which the wireless tag 3 and radio communication equipment 4 other than a radio communication equipment 4 perform bidirectional radio. In addition, since the wireless tag 3 and other radio communication equipments 19 which were shown in <u>drawing 14</u> and <u>drawing 15</u>, they attach the same sign and omit the explanation. Moreover, the radio communications system of each operation gestalt of not only this operation gestalt but this invention is constituted including said wireless tag 3 and other radio communication equipments 19. The wireless tag 3 can write information in memory by wireless.

transmission-and-reception eliminator 45, and other radio communication equipments 19. The bidirectional wireless transceiver antenna which receives a signal from other equipment 4 transmits a signal to the source 40 of transmission, a signal distribution receives the signal transmitted from the wireless tag 3 It is constituted including the communication equipments 19, and a question means to perform the communication transceiver common antenna 46, the receiving RF section 47, a demodulator 48, the box 41, a modulator 42, the transmitting RF section 43, the signal eliminator 44, the [0060] A radio communication equipment 4 can be used as an interrogator in which transmits a signal to the wireless tag 3, As a wireless tag receiving antenna which radio communication equipments 19, The wireless tag transmitting antenna which functioning bidirectional wireless transmission and reception and the wireless tag wireless tag demodulator 49, the information signal input section 50, the recovery the communication link with the wireless tag 3 is possible while consisting of a link with the wireless tag 3 and being able to use as the wireless LAN in which bidirectional radio is possible, or a portable telephone. A radio communication [0061] The bidirectional radio means of a radio communication equipment 4 A bidirectional radio means to perform bidirectional radio with other radio signal output part 51, and the tag recovery signal output part 52.

subcarrier The subcarrier sent in the source 40 of transmission which sends, and the source 40 of transmission. The transmission—and—reception eliminator 45, the bidirectional wireless transmission and reception and the wireless tag transceiver common antenna 46 which separate the signal transmitted from the transmitting RF section 43 which consists of the modulator 42 and filter which are a modulation means to become irregular, amplifier, etc., the signal transmitted to other radio communication equipments 19, and other radio communication equipments 19. The information for modulating a subcarrier with the receiving RF section 47 which consists of a filter, amplifier, etc., the demodulator 48 which is a recovery means to restore to the signal transmitted from other radio communication equipments 19, and a modulator 42, and a demodulator 48 It is constituted including the outputting recovery signal output part 51.

[0062] The question means of a radio communication equipment 4 consists of the transmitting RF section 43 and circulator which consist of a signal distribution box 41 which takes out the subcarrier sent in the source 40 of transmission, a modulator 42 which modulates the subcarrier sent in the source 40 of transmission, a filter, amplifier, etc., a coupler, etc. The signal transmitted to the wireless tag 3, and the signal transmitted from the wireless tag 3 With the wireless tag demodulator 49 and modulator 42 which are a wireless tag recovery means to restore to the signal transmitted from the receiving RF section 47 which consists of the signal eliminator 44 to separate, the transmission-and-reception eliminator 45, bidirectional wireless transmission and reception and a wireless tag transceiver common antenna 46, a filter, amplifier, etc., and the wireless tag 3, a subcarrier It is constituted including the information signal input section 50 which inputs the information for becoming irregular, and the tag recovery signal output part 52 which outputs the signal to which it restored with the wireless tag demodulator 48.

[0063] With the bidirectional radio means and question means which were mentioned above, although the source 40 of transmission, a modulator 42, the transmitting RF section 43, the transmission-and-reception eliminator 45, bidirectional wireless transmission and reception and a wireless tag transceiver common antenna 46, and the information signal input section 50 are share-ized as radical headquarters, a modulator 42, the information signal input section 50, and transmitting RF section 43 grade may divide according to the signal aspect which communicates.

[0064] When performing the FURIKEN C hopping which communicates while it may be

fixed and a frequency is changed, the frequency of the subcarrier sent in the source 40 of transmission of a radio communication equipment 4 may be constituted so that it may have the frequency adjustable function to change the frequency which sends in the source 40 of transmission. Moreover, in <u>drawing 1</u>, when a switch is used for the transmission-and-reception eliminator 45, the signal-processing section which processes the signal outputted from the signal-processing section, the recovery signal output part 51, and the tag recovery signal output part 52 which process the signal inputted into the control section for changing this switch and the information signal input section 50 is omitting.

the receiving RF section 47 via the transmission-and-reception eliminator (switch) 45 communication equipments 19, the bidirectional radio means mentioned above is used. modulating signal modulated with the modulator 42 is transmitted via the transmitting RF section 43, the signal eliminator 44, and the transmission-and-reception eliminator transmission and reception and the wireless tag transceiver common antenna 46, and information signal to which it restored with the demodulator 48 is taken out from the switched to the reception RF 47 side, and restores to it with a demodulator 48. The equipments 19. On the other hand, when receiving the signal transmitted from other [0065] Next, actuation of a radio communication equipment 4 is explained. First, the based on the information inputted from the information signal input section 50. The the signal transmitted from other radio communication equipments 19 passes along communication equipments 19. With this operation gestalt, a switch is used for the subcarrier sent in the source 40 of transmission is modulated with a modulator 42 performed is explained. When performing the communication link with other radio transmission-and-reception eliminator 45 as using a TDD (Time Division Duplex) transceiver common antenna 46. This signal is sent to other corresponding radio case where bidirectional radio with other radio communication equipments 19 is communication link for the communication link with other radio communication 45 from bidirectional wireless transmission and reception and the wireless tag When transmitting a signal to other radio communication equipments 19, the radio communication equipments 19, it is received by bidirectional wireless recovery signal output part 51.

[0066] Next, the case (RFID actuation is called hereafter) where a radio communication equipment 4 is operated as an interrogator of a RFID system is explained. When performing the communication link with the wireless tag 3, the question means mentioned above is used. First, the subcarrier sent in the source 40 of transmission is sent out to the wireless tag 3 through a modulator 42, the

transmitting RF section 43, the signal eliminator 44, and the transmission—and—reception eliminator 45 from bidirectional wireless transmission and reception and the wireless tag transceiver common antenna 46. Although the modulator 42 used by the communication link with other radio communication equipments 19 is performing the modulation in the communication link with the wireless tag 3 with this operation gestalt, when a difference is in the communication mode of other radio communication equipments 19 and the wireless tag 3, the more nearly optimal modulator may be formed independently. Moreover, the transmitting RF section 43 may also be divided into the optimal gestalt. In forming separately the modulator which performs the communication link with the modulator and the wireless tag 3 which are used for the communication link with other radio communication equipments 19, the two information signal input sections 50 are formed, and it inputs an information signal into each modulator.

switch in the time of transmission of \*\* or the bidirectional radio mentioned above. It transmission and reception and the wireless tag transceiver common antenna 46, and this signal is received by the wireless tag 3. With the wireless tag 3, after receiving the transmits by the are recording information which this wireless tag 3 has. It is received signal transmitted from a radio communication equipment 4, it becomes irregular and by the transmission-and-reception eliminator 45. In RFID actuation, it is fixed to the which is the transmission-and-reception eliminator 8 is performed in the state of the by bidirectional wireless transmission and reception and the wireless tag transceiver common antenna 46, and the signal transmitted from the wireless tag 3 is separated signal eliminator 44, i.e., transmitting system with modulator 42, side, and the switch becoming irregular or a modulator 42. It is transmitted from bidirectional wireless [0067] When reading the information currently written in the wireless tag 3, the command information for reading the information on the wireless tag 3 with no subcarrier sent in the source 40 of transmission is modulated for the read-out is also possible to perform RFID actuation by this configuration at the time of transmission to other radio communication equipments 19.

[0068] The signal turned up and transmitted from the wireless tag 3 is sent to the wireless tag demodulator 49, after being separated by the signal eliminator 44. The wireless tag demodulator 49 is a demodulator of the synchronous-detection mold which restores to the signal which inputs a part of subcarrier from the source 40 of transmission taken out by the signal distribution box 41, and is transmitted from the wireless tag 3. Moreover, what arranges and took out the signal distribution box 41 to the output side of a modulator 42 may be used for the signal used for a synchronous

detection with the wireless tag demodulator 49. Moreover, although the wireless tag demodulator 49 of this operation gestalt is a demodulator of a synchronous-detection mold, the wireless tag demodulator 49 may be an independent demodulator. The signal to which it restored in the wireless tag recovery section 49 is taken out from the tag recovery signal output part 52.

by using each part in common, simplification and a miniaturization of equipment can be perform the communication link with other radio communication equipments 19. Thus, [0069] As mentioned above, in the radio communication equipment 4 of this operation gestalt, the source 40 of transmission, the transmission-and-reception eliminator 45, when for example, a bidirectional radio means is used as the base and it constitutes a attained and a manufacturing cost is also held down. Moreover, what is necessary is communication link with the wireless tag 3 with the easy configuration which equips communication link with the bidirectional radio means and the wireless tag 3 which transmission-and-reception eliminator 45 was considered as the switch. Moreover, and bidirectional wireless transmission and reception and wireless tag transceiver radios 4 of this operation gestalt, as what performs a TDD (Time Division Duplex) common antenna 46 grade are share-ized with a question means to perform the just to use a diplexer as a transmission-and-reception eliminator in the wireless radio communication equipment 4, it becomes possible to perform not only the communication link with other radio communication equipments 19 but the this bidirectional radio means with the signal eliminator 44, the wireless tag communication link, in performing a FDD communication link although the demodulator 49, and the tag recovery signal output part 52.

[0070] <u>Drawing 2</u> is drawing showing the radio structure of a system containing the radio communication equipment 5 which are other operation gestalten of this invention. With the radio communication equipment 5 shown in <u>drawing 2</u>, the same sign is given to the part which overlaps the radio communication equipment 4 of said operation gestalt shown in <u>drawing 1</u>, and the explanation is omitted. Although a radio communication equipment 5 is the almost same configuration as the radio communication equipment 4 of said operation gestalt and is not equipped with a signal eliminator, it is equipped with the wireless tag receiving antenna 53 which receives the signal further transmitted from the wireless tag 3.

[0071] A radio communication equipment 5 can be used as an interrogator in which the communication link with the wireless tag 3 is possible while consisting of a bidirectional radio means to perform bidirectional radio with other radio communication equipments 19, and a question means to perform the communication

link with the wireless tag 3 and being able to use as the wireless LAN in which bidirectional radio is possible, or a portable telephone.

transmission-and-reception eliminator 45, and other radio communication equipments section 47, a demodulator 48, the information signal input section 50, and the recovery transmitting common antenna 76, the wireless tag receiving antenna 53 that receives simplification and a miniaturization of equipment can be attained and a manufacturing transmitting antenna which transmits a signal to the wireless tag 3, the receiving RF share-ized in a bidirectional radio means and a question means. A modulator 42, the means of a radio communication equipment 5 transmits a signal to the source 40 of the signal transmitted from the wireless tag 3, the wireless tag demodulator 49, the constituted including the bidirectional wireless transmission and reception and the eliminator 45, bidirectional wireless transmission and reception and a wireless tag communication mode of a both-hands stage. Thus, by using each part in common, [0072] The bidirectional wireless transceiver antenna which the bidirectional radio constituted including the source 40 of transmission, a signal distribution box 41, a eliminator 45, bidirectional wireless transmission and reception and a wireless tag transmitting RF section 43, the transmission-and-reception eliminator 45 as well transmitting common antenna 76, and the information signal input section 50 are [0073] In the radio communication equipment 5, the source 40 of transmission, a wireless tag transmitting common antenna 76 which functions as a wireless tag he radio communication equipment 4 of drawing 1, etc. may be divided by the information signal input section 50, and the tag recovery signal output part 52. modulator 42, the transmitting RF section 43, the transmission-and-reception modulator 42, the transmitting RF section 43, the transmission-and-reception 19, and receives a signal from other radio communication equipments 19, It is signal output part 51. Moreover, the question means of the radio means 5 is transmission, a modulator 42, the transmitting RF section 43, the sost is also held down.

[0074] Since communication link actuation with other radio communication equipments 19 is the same as that of the radio communication equipment 4 of said operation gestalt in a radio communication equipment 5, explanation is omitted. [0075] RFID actuation of a radio communication equipment 5 is explained below. The question means mentioned above is used for the communication link with the wireless tag 3. The subcarrier sent in the source 40 of transmission is sent out through a modulator 42, the transmitting RF section 43, and the transmission-and-reception eliminator 45 from bidirectional wireless transmission and the wireless

wireless tag receiving antenna 53, and the signal transmitted from the wireless tag 3 is out by the are recording information which this wireless tag 3 has. It is received by the the bidirectional wireless transmission and reception and the wireless tag transmitting in the wireless tag 3, the subcarrier sent in the source 40 of transmission is modulated for the read-out command information for reading the information on the wireless tag 3 with no becoming irregular or a modulator 42. It is transmitted from the bidirectional ransmitted from a radio communication equipment 5, it becomes irregular and sends nputs a part of subcarrier from the source 40 of transmission taken out by the signal (0076] As mentioned above, a radio communication equipment 5 is equipped with the transmitting common antenna 76. The sending signal to the wireless tag 3 can perform communication link with the wireless tag 3, and receiving the signal from the wireless antenna 76 which has a role of a wireless tag transmitting antenna, and this signal is ag transmitting common antenna 76. When reading the information currently written the communication link with the wireless tag 3 more efficiently by transmitting using wireless tag receiving antenna 53 which receives the signal from the wireless tag 3 sent to the wireless tag recovery section 49. The wireless tag recovery section 49 other than bidirectional wireless transmission and reception and the wireless tag eceived by the wireless tag 3. With the wireless tag 3, after receiving the signal distribution box 41, and restores to the signal received from the wireless tag 3. common antenna 76 which performs a communication link wide range than the wireless transmission and reception and the wireless tag transmitting common communication link with other radio communication equipments, i.e., the tag 3 using the directive high wireless tag receiving antenna 53.

[0077] <u>Drawing 3</u> (a) is drawing showing the radio structure of a system containing the radio communication equipment 6 of the operation gestalt of further others of this invention. With the radio communication equipment 6 shown in <u>drawing 3</u> (a), the same sign is given to the part which overlaps the radio communication equipment 5 shown in <u>drawing 1</u> or <u>drawing 2</u>, and the explanation is omitted. The radio communication equipment 6 of this operation gestalt is the almost same configuration as the radio communication equipment 4 of said operation gestalt, and is equipped with the antenna transfer switch 55 which switches the bidirectional wireless transceiver antenna 86 and the wireless tag transceiver antenna 54 by the communication link with the wireless tag transceiver antenna 54 which receives the signal from sending out and the wireless tag transceiver antenna 54 which receives the signal from sending out and the wireless tag 3 for a signal to the wireless tag 3, and other radio communication equipments 19 or the wireless tag 3.

[0078] A radio communication equipment 6 can be used as an interrogator in which the communication link with the wireless tag 3 is possible while consisting of a bidirectional radio means to perform bidirectional radio with other radio communication equipments 19, and a question means to perform the communication link with the wireless tag 3 and being able to use as the wireless LAN in which bidirectional radio is possible, or a portable telephone.

[0079] The bidirectional radio means of a radio communication equipment 6 transmits a signal to the source 40 of transmission, a modulator 42, the transmitting RF section 43, the antenna changeover switch 55, the transmission-and-reception eliminator 45, and other radio communication equipments 19, and consists of other radio communication equipments 19 including the bidirectional wireless transceiver antenna 86 and the receiving RF section 47 which receive a signal, the recovery section 48, the information signal input section 50, and the recovery signal output part 51. Moreover, the question means of a radio communication equipment 6 is constituted including the wireless tag transceiver antenna 54 which has the function of a wireless tag receiving antenna receive the signal transmitted from the wireless tag transmitting antenna and the wireless tag 3 which transmit a signal to the source 40 of transmission, a signal distribution box 41, a modulator 42, the transmitting RF section 43, the signal eliminator 44, the antenna changeover switch 55, and the wireless tag 3, the wireless tag demodulator 49, the information signal input section 50, and the tag recovery signal output part 52.

10080] With the bidirectional radio means and question means which were mentioned above, the source 40 of transmission, the antenna changeover switch 55, etc. are share-ized further. Thus, with a bidirectional radio means and a question means, by using each part in common, simplification and a miniaturization of equipment can be attained and reduction of a manufacturing cost can be aimed at.

[0081] Communication link actuation with other radio communication equipments 19 of a radio communication equipment 6 is in the condition which switched the antenna transfer switch 55 to the bidirectional wireless transceiver antenna 86 side, and since it is carried out like the radio communication equipment 4 of said operation gestalt, it omits explanation.

[0082] RFID actuation of a radio communication equipment 6 is explained below. The question means mentioned above is used for the communication link with the wireless tag 3. The subcarrier sent in the source 40 of transmission passes along the antenna transfer switch 55 switched to the modulator 42, transmitting RF section 43, signal eliminator 44, and wireless tag transceiver antenna 54 side, and is transmitted from

the wireless tag transceiver antenna 54. When reading the information currently written in the wireless tag 3, the subcarrier sent in the source 40 of transmission is modulated in inputting the read-out command information for reading the information on the wireless tag 3 with no becoming irregular or a modulator 42 from the information input section 50. It passes along the antenna changeover switch 55, and is transmitted from the wireless tag transceiver antenna 54, and the signal outputted from a modulator 42 is received by the wireless tag 3. With the wireless tag 3, after receiving the signal transmitted from a radio communication equipment 6, it becomes irregular and sends out by the are recording information which this wireless tag 3 has. It is received by the wireless tag transceiver antenna 54, and the signal sent out from the wireless tag 3 passes along the antenna transfer switch 55 and the signal eliminator 44, and is sent to the wireless tag recovery section 49. The wireless tag recovery section 49 inputs a part of subcarrier from the source 40 of transmission taken out by the signal distribution box 41, and restores to the signal received from the wireless tag 3.

[0083] As mentioned above, a radio communication equipment 6 is equipped with a signal with the wireless tag transceiver antenna 54 which receives the signal from sending out and the wireless tag 3 to the bidirectional wireless transceiver antenna 86 which performs the communication link with other radio communication equipments 19, and the wireless tag 3, by the communication link with other radio communication equipments 19, or the communication link with the wireless tag 3, switches the antenna transfer switch 55 and is considering it as the configuration which uses the bidirectional wireless transceiver antenna 86 and the wireless tag transceiver antenna 54 properly. Therefore, the description of each communication link can be effectively demonstrated by using a separate antenna for the communication link with the communication link with other radio communication equipments 19, and the wireless tag 3.

[0084] In addition, as shown in the local Fig. of <u>drawing 3</u> (b), in a radio communication equipment 6, the antenna changeover switch 55 and the wireless tag transceiver antenna 54 may be placed between the bidirectional wireless transceiver antenna 86 and the transmission-and-reception part device 45. By this, a radio communication equipment 6 can also perform the communication link with the wireless tag 3, while transmitting to other radio communication equipments 19 depending on communication environment.

[0085]  $\overline{\text{Drawing 4}}$  is drawing showing the radio structure of a system containing the radio communication equipment 7 of the operation gestalt of further others of this

gestalt, the radio communication equipment 7 of this operation gestalt restores to the signal received in the communication link with other radio communication equipments modulation techniques, such as PSK (Pulse Sift Keying) and QPSK (Quadrature Phase system is used, it can be made to serve a double purpose to both communication links. sign is given to the part which overlaps the radio communication equipment 4 of said [0086] Although the separate demodulator was used for the communication link with communication equipments 19, and a question means to perform the communication 19 and the wireless tag 3 with one recovery means (multifunctional demodulator 57). invention. With the radio communication equipment 7 shown in drawing 4, the same Usually, in two-way communication with other radio communication equipments 19, [0087] A radio communication equipment 7 can be used as an interrogator in which demodulator of PSK, a QPSK synchronous-detection method, or a delay detection wireless tag 3 in the radio communication equipments 4, 5, and 6 of said operation Sift Keying), are often used. On the other hand, in the communication link of RFID actuation, modulation techniques, such as simple ASK (Amplitude Sift Keying) or other radio communication equipments 19, and the communication link with the the communication link with the wireless tag 3 is possible while consisting of a ink with the wireless tag 3 and being able to use as the wireless LAN in which simple PSK, are used. Therefore, as a multifunctional demodulator 57, if the bidirectional radio means to perform bidirectional radio with other radio operation gestalt shown in drawing 1, and the explanation is omitted. bidirectional radio is possible, or a portable telephone.

[0088] The bidirectional radio means of a radio communication equipment 7 is constituted including the signal coupler 56 which combines alternatively with the multifunctional demodulator 57 the signal transmitted from the signal or the wireless tag 3 transmitted from the source 40 of transmission, a modulator 42, the transmitting RF section 43, the transmission—and—reception eliminator 45, bidirectional wireless transmission and reception and a wireless tag transceiver common antenna 46, and other radio communication equipments 19, the receiving RF section 47, the multifunctional demodulator 57, the information signal input section 50, and the recovery signal output part 51. Moreover, the question means of a radio communication equipment 7 is constituted including the source 40 of transmission, a modulator 42, the transmitting RF section 43, the signal eliminator 44, the transmission—and—reception eliminator 45, bidirectional wireless transmission and reception and a wireless tag transceiver common antenna 46, the signal coupler 56, the receiving RF section 47, the multifunctional demodulator 57, the information signal

input section 50, and the recovery signal output part 51.

operation gestalt in a radio communication equipment 7 where the switch which is the signal coupler 56 is connected to the transmission-and-reception eliminator 45 by the showed, an antenna changeover switch and a wireless tag transceiver antenna may be and reception and the wireless tag transceiver common antenna 46, and this signal is signal eliminator 44. It is separated by the signal eliminator 44, and the signal received ecovery signal output part 51, and the are recording information on the wireless tag 3 placed between bidirectional wireless transmission and reception and the wireless tag wireless transmission and reception and the wireless tag transceiver common antenna circulator, a coupler, etc. may be used. Moreover, the switch which is the transceiver communication mode in communication link actuation with other radio communication 46. When reading the information currently written in the wireless tag 3, the subcarrier transmitted from a radio communication equipment 7, it becomes irregular and sends rregular or a modulator 42. It is transmitted from bidirectional wireless transmission section 47, and restores to them with the multifunctional demodulator 57. In a radio transceiver common antenna 46, and the transmission-and-reception eliminator 45. eliminator 45 is fixed to a transmitting system side in RFID actuation. The signal to out by the are recording information which this wireless tag 3 has. It is received by equipments 19, explanation is omitted. In addition, as the local Fig. of drawing 3 (b) common antenna 46, and the signal sent out from the wireless tag 3 is sent to the eliminator 44, and the transmission-and-reception eliminator 45 from bidirectional communication equipment 7, although RF switch is used as a signal coupler 56, a mentioned above is used. The subcarrier sent in the source 40 of transmission is bidirectional wireless transmission and reception and the wireless tag transceiver eceived by the wireless tag 3. With the wireless tag 3, after receiving the signal 0090] Below, RFID actuation of a communication terminal 7 is explained. When rom the wireless tag 3 passes along the signal coupler 56 and the receiving RF which it restored with the multifunctional demodulator 57 is taken out from the performing the communication link with the wireless tag 3, the question means [0089] Since it is carried out like the radio communication equipment 4 of said ransmitted through a modulator 42, the transmitting RF section 43, the signal sent in the source 40 of transmission is modulated for the read-out command nformation for reading the information on the wireless tag 3 with no becoming

[0091] As mentioned above, the source 40 of transmission, the transmission and transmission and

the operation gestalt of further others of this invention. <u>Drawing 5</u> is drawing showing demodulator 57 of the radio communication equipment 7 of said operation gestalt with With the radio communication equipment 8 shown in drawing 5 , the same sign is given bidirectional radio means and question means of a radio communication equipment 7 multifunctional demodulator 58 of a synchronous-detection mold through the source switch 59 of a signal. The signal led to the multifunctional demodulator 58 is used as a .0092] Moreover, it is good also as a multifunctional demodulator 58 which used the reception and a wireless tag transceiver common antenna 46, the signal coupler 56, as radical headquarters. Therefore, simplification and a miniaturization of equipment the configuration of the radio communication equipment 8 of this operation gestalt. operation gestalt shown in drawing 1 and drawing 4, and the explanation is omitted. communication link with other radio communication equipments 19 and the wireless (PhaseLocked Loop) circuit as a demodulator of a synchronous-detection method, communication equipment 8, the subcarrier from the source 40 of transmission is synchronous-detection method of a carrier playback mold for the multifunctional 0093] A radio communication equipment 8 restores to the signal received in the making the dispatch wave which carried out phase simulation to the signal which to the part which overlaps the radio communication equipments 4 and 7 of said method of a carrier playback mold. Various approaches, such as an approach of tag 3 with the multifunctional demodulator 58 using the synchronous-detection formation, are used. Moreover, when using as an interrogator, the source 40 of and performing a synchronous detection, and a method using the Costas loop and multifunctional demodulator 57 grade are communalized and used for the taken out by the signal distribution box 41, and this signal is \*\*(ed) to the can be attained and reduction of a manufacturing cost can be aimed at. transmission is used as a carrier for synchronous detections. In a radio formed the transmitter in the demodulator and was received by the PLL carrier for synchronous detections.

[0094] It is good also as a configuration which sends the signal which receives the signal transmitted from the wireless tag 3 without considering as the configuration which sends the signal received from the wireless tag 3 with the operation gestalt of further others of this invention using the signal eliminator 44 like the radio communication equipment 7 of said operation gestalt to the signal coupler 56, which was equipped with wireless tag receiving—antenna 53, and which was received with this wireless tag receiving antenna 53 to the signal coupler 56. <u>Drawing</u> 6 is drawing showing the radio structure of a system containing the radio communication

drawing 4, and the radio communication equipments 5 and 7 of said operation gestalt equipment 9 of this operation gestalt, with the radio communication equipment 9 shown in drawing 6, the same sign is given to the part which overlaps drawing 2 boiled and shown, and the explanation is omitted.

communication equipments 19, and a question means to perform the communication .0095] A radio communication equipment 9 can be used as an interrogator in which the communication link with the wireless tag 3 is possible while consisting of a ink with the wireless tag 3 and being able to use as the wireless LAN in which bidirectional radio means to perform bidirectional radio with other radio bidirectional radio is possible, or a portable telephone.

signal coupler 56, the receiving RF section 47, the multifunctional demodulator 57, the constituted including the source 40 of transmission, a modulator 42, the transmitting the question means of a radio communication equipment 9 is constituted including the reception and the wireless tag transmitting common antenna 76 that function on the information signal input section 50, and the recovery signal output part 51. Moreover, wireless tag receiving antenna 53, the signal coupler 56, the receiving RF section 56, transmission and reception and a wireless tag transmitting common antenna 76, the the multifunctional demodulator 57, the information signal input section 50, and the RF section 43, the transmission-and-reception eliminator 45, bidirectional wireless wireless tag 3 as wireless tag transmitting antennas which transmit a signal, the source 40 of transmission, a modulator 42, the transmitting RF section 43, the [0096] The bidirectional radio means of a radio communication equipment 9 is transceiver separation section 45, the bidirectional wireless transmission and recovery signal output part 51.

[0097] As radical headquarters, the bidirectional radio means and question means of a reception and a wireless tag transmitting common antenna 76, the signal coupler 56, receiving antenna 53 which receives the signal transmitted from the wireless tag 3, [0098] Since a radio communication equipment 9 is equipped with the wireless tag transmission and reception and the wireless tag transmitting common antenna 76 transmission-and-reception eliminator. 45, bidirectional wireless transmission and the sending signal to the wireless tag 3 transmits using the bidirectional wireless radio communication equipment 9 share-ize the source 40 of transmission, the and multifunctional demodulator 57 grade, and they are used for them.

tag 3, and receives the signal from the wireless tag 3 using the directive high wireless other radio communication equipments, i.e., the communication link with the wireless which performs a communication link wide range than the communication link with

means mentioned above. The subcarrier sent in the source 40 of transmission is sent having become irregular in part, and results in the wireless tag 3. It is received by the restores to it, and the information on the wireless tag 3 is taken out from the recovery eliminator 45, and bidirectional wireless transmission and reception and a wireless tag ransmitting common antenna 76 in no becoming irregular thru/or the condition of inputted into bidirectional wireless transmission and reception and the wireless tag [ configuration / of the transmitting RF section 43 ]. Communication link actuation with other radio communication equipments 19 does not involve, but since it is the same as that of the radio communication equipment 7 of drawing 4, especially the signal output part 51. Although a part of signal returned from the wireless tag 3 is returned from the wireless tag 3 goes into the multifunctional demodulator 57, it [0099] RFID actuation of a radio communication equipment 9 uses the question wireless tag receiving antenna 53, and through the signal coupler 56, the signal transmitting common antenna 76, this does not become a problem by devising tag receiving antenna 53. Thus, the feebleer signal from the wireless tag 3 is out through the transmitting RF section 43, the transmission-and-reception receivable by using the directive high wireless tag receiving antenna 53. wireless tag receiving antenna 53 omits explanation.

[0100] As mentioned above, by using a common part with a bidirectional radio means and a question means, simplification and a miniaturization of equipment can be attained and a manufacturing cost can be reduced.

demodulator 57 of the radio communication equipment 9 of said operation gestalt with Nith the radio communication equipment 10 of this operation gestalt, the same sign is given to the part which overlaps the radio communication equipments 8 and 9 of said the operation gestalt of further others of this invention. Drawing 7 is drawing showing the configuration of the radio communication equipment 10 of this operation gestalt. same sign is given to the part which overlaps the radio communication equipment of operation gestalt shown in drawing 5 and drawing 6, and the explanation is omitted. radio communication equipment 11 of the operation gestalt of further others of this 0102] Drawing 8 is drawing showing the radio structure of a system containing the nvention. With the radio communication equipment 11 of this operation gestalt, the synchronous-detection method of a carrier playback mold for the multifunctional equipments and RFID actuation are the same as that of the radio communication equipment 7 of said operation gestalt fundamentally, the explanation is omitted. Moreover, since communication link actuation with other radio communication [0101] It is good also as a multifunctional demodulator 58 which used the

said operation gestalt, and the explanation is omitted. A radio communication equipment 11 is the almost same configuration as the radio communication equipment 7 of said operation gestalt, and is equipped with the signal coupler 60 which switches the bidirectional wireless transceiver antenna 86 and the wireless tag transceiver antenna 54 to the wireless tag 3 by the communication link with the wireless tag transceiver transceiver antenna 54 which receives the signal to which a signal is transmitted from transmission and the wireless tag 3, and other radio communication equipments 19 and the wireless tag 3.

[0103] A radio communication equipment 11 can be used as an interrogator in which the communication link with the wireless tag 3 is possible while consisting of a bidirectional radio means to perform bidirectional radio with other radio communication equipments 19, and a question means to perform the communication link with the wireless tag 3 and being able to use as the wireless LAN in which bidirectional radio is possible, or a portable telephone.

Constituted including the source 40 of transmission, a modulator 42, the transmitting constituted including the source 40 of transmission, a modulator 42, the transmitting RF section 43, the signal coupler 60, the transmission-and-reception eliminator 45, the bidirectional wireless transceiver antenna 86, the signal coupler 56, the receiving RF section 47, the multifunctional demodulator 57, the information signal input section 50, and the recovery signal output part 51. Moreover, the question means of a radio communication equipment 11 is constituted including the source 40 of transmission, a modulator 42, the transmitting RF section 43, the signal coupler 60, the transmitting RF section 43, the wireless tag transceiver antenna 54, the signal coupler 56, the receiving RF section 47, the multifunctional demodulator 57, the information input section 50, and the recovery signal output part 51.

[0105] The source 40 of transmission, the signal coupler 60, the signal coupler 56, the receiving RF section 47, and multifunctional demodulator 57 grade are communalized and used for the bidirectional radio means and question means of a radio communication equipment 11 as radical headquarters. Simplification and a miniaturization of equipment can be attained by considering as such a configuration, and reduction of a manufacturing cost is possible.

[0106] When performing the communication link with other radio communication equipments, a radio communication equipment 11 connects to the transmission-and-reception eliminator 45 side RF switch which are the signal coupler 60 (this operation gestalt switch) and the signal coupler 56, and communicates using the bidirectional wireless transceiver antenna 86 of an above-mentioned bidirectional

radio means. On the other hand, in RFID actuation, the signal coupler 60 and the signal coupler 56 are connected to the signal eliminator 44, and it is performed using an above—mentioned question means. The subcarrier from the source 40 of transmission is sent out from the wireless tag transceiver antenna 54 via a modulator 42, the transmitting RF section 43, the signal coupler 60, and the signal eliminator 44. It is received by the wireless tag transceiver antenna 54, it is separated by the signal eliminator 44, and restores to the signal from the wireless tag 3 with the multifunctional demodulator 57 via the signal coupler 56 and the receiving RF section 47. Thus, in the case of a communication link, it is switched and used for the antenna suitable for each communication link with other radio communication equipments or the wireless tag 3.

[0107] It is good also as a multifunctional demodulator which used the synchronous-detection method of a carrier playback mold for the multifunctional demodulator 57 of the radio communication equipment 11 of said operation gestalt with the operation gestalt of further others of this invention. <u>Drawing 9</u> is drawing showing the configuration of the radio communication equipment 12 of this operation gestalt. With the radio communication equipment 12 of this operation same sign is given to the part which overlaps the radio communication equipment of said operation gestalt, and the explanation is omitted. The radio communication equipment 12 of this operation gestalt restores to the signal received in the communication link with other radio communication equipments and a wireless tag with the multifunctional demodulator 58 using the synchronous-detection method of a carrier playback mold. Since communication link actuation with other radio communication equipment 11 of said operation abbreviates explanation to the radio communication equipment 11 of said operation

[0108] <u>Drawing 10</u> is drawing showing the configuration of the communication system containing the radio communication equipment 13 of the operation gestalt of further others of this invention. The radio communication equipment 13 of this operation gestalt is constituted including the question section 15 which is a question means to perform the communication link with the bidirectional Radio Communications
Department 14 and the wireless tag which are the bidirectional radio means which communicates with other radio communication equipments 19.

Confinance to bidirectional Radio Communications Department 14 is the same configuration as the conventional bidirectional radio communication equipment 1 shown in <u>drawing 14</u>, it omits the explanation. The bidirectional Radio

Communications Department 14 and the question section 15 can also constitute possible [ description ].

[0110] <u>Drawing 11</u> is drawing showing the configuration of the question section 15 of a radio communication equipment 13. An interrogator 15 is constituted including the bidirectional wireless receiving antenna 62 which receives directly the signal sent out from the antenna of the bidirectional Radio Communications Department 14, the wireless tag receiving antenna 63 which receives the signal sent out from the wireless tag 3, a demodulator 64, the signal-processing section 65, and the recovery signal output part 66.

[0111] Next, RFID actuation of a radio communication equipment 13 is explained. The bidirectional Radio Communications Department 14 sends a signal from an antenna 24, in order to communicate. Although an antenna 24 is the same antenna as the conventional antenna 24 shown in <u>drawing 14</u>, it transmits the signal to transmission and reception of the signal of 19 with bidirectional radio equipment, transmission of the signal of 19 with bidirectional radio equipment, transmission of the signal of 19 with bidirectional radio equipment, transmission of the signal to a wireless tag, and the antenna 63 of a question means. The signal sent from the antenna 24 results also in the wireless tag 3 which exists in a certain distance, and is inputted also into the bidirectional wireless receiving antenna 62 of the question section 15 further arranged near an antenna 62 at though a part of this sending signal results also in the wireless tag receiving antenna 63 of the question section 15. For example, with this operation gestalt, the wireless tag receiving antenna 63 is made into a flat antenna with directivity, and is arranged on the side face of the question section 15.

[0112] The signal inputted into the wireless tag 3 is modulated for the information held in the wireless tag 3, and the modulating signal is emitted from the wireless tag 3. It is received by the wireless tag receiving antenna 63 of the question section 15, and the modulating signal emitted from this wireless tag 3 is inputted into the demodulator 64 which consists of synchronous detectors etc. On the other hand, the signal sent out from the antenna 24 of the bidirectional Radio Communications Department 14 which received with the bidirectional wireless receiving antenna 62 is also inputted into a demodulator 64, a mixed recovery is carried out with the modulating signal from the wireless tag 3, and the modulating signal from the wireless tag 3 restores to the question section 15. The information to which it restored in the demodulator 64 lets the signal-processing machine 65 pass, and is taken out from the recovery signal output part 66. The information taken out from the wireless tag 3 is accumulated in

the signal-processing machine 65, or can also be transmitted to other radio communication equipments 19 by the two-way communication section 14. [0113] Moreover, when it becomes irregular by simple ASK etc. in the wireless tag 3, the bidirectional wireless receiving antenna 62 is it not being necessarily required, and the wireless tag receiving antenna's 63 receiving the modulating signal from the wireless tag 3, and carrying out AM recovery with a demodulator 64, and can also take out the information on the wireless tag 3.

case it is simplified sharply and an interrogator performs the communication link with antenna may not receive the modulated wave emitted from the signal and the wireless [0114] Thus, in the radio communication equipment 13 of this operation gestalt, since modulating signal from the wireless tag 3, both phase contrast cannot be set up freely. Therefore, if these signals have a specific reception relation, since a demodulator 65 specific conditions) peculiar to a synchronous detection will produce it. This problem section 15 of said operation gestalt shown in drawing 11, but as shown in drawing 12 is a synchronous-detection method, the Nur point (a recovery output is set to 0 on tag 3 from the bidirectional Radio Communications Department 14 like the question bidirectional Radio Communications Department 24, if the wireless tag 3 is read in the same antenna 67 may receive. In this case, since one antenna 67 receives the other radio communication equipments 19, it can use an electric wave effectively. [0115] With the operation gestalt of further others of this invention, a separate information is read in the wireless tag 3 using the signal transmitted from the signal from the bidirectional Radio Communications Department 14, and the JP,7-131403,A. By considering as such a configuration, simplification and a is solvable by using the frequency-hopping method currently indicated by miniaturization of the question section 16 can be attained.

[0116] Moreover, it is good also as a configuration which prepares two antennas for the bidirectional Radio Communications Department 14 of said operation gestalt shown in <u>drawing 10</u> with the operation gestalt of further others of this invention.

<u>Drawing 13</u> is an enlarged drawing near [ in the bidirectional Radio Communications Department 17 of this operation gestalt ] the antenna. The bidirectional Radio Communications Department 17 is the same configuration as the conventional bidirectional radio communication equipment 1, and only the parts of an antenna differ. The bidirectional Radio Communications Department 17 of this operation gestalt has the antenna changeover switch 69 which switches the wireless tag transmitting antenna 68 which sends a signal to the wireless tag 3 other than the antenna 24 which performs the communication link with other radio communication equipments 19, and

an antenna 24 and the wireless tag antenna 68. Communication link sensibility with the wireless tag 3 can be raised to the wireless tag transmitting antenna 68 by using an antenna with high directivity compared with an antenna 24.

[0117] moreover, in the radio communication equipments 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13 of each operation gestalt mentioned above Although only the actuation which reads the information accumulated in the wireless tag 3 in the communication link with the wireless tag 3 is described, write—in actuation of the information on the wireless tag 3 Usually, for example, an ASK modulation can be given to the sending signal of a radio communication equipment as it carries out, and it can realize easily by getting over with the wireless tag 3 etc.

[Translation done.]

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2.\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

# **DESCRIPTION OF DRAWINGS**

# [Brief Description of the Drawings]

[Drawing 1] It is drawing showing the radio structure of a system containing the radio communication equipment 4 which is one gestalt of operation of this invention.

[Drawing 2] It is drawing showing the radio structure of a system containing the radio communication equipment 5 which are other operation gestalten of this invention.

[Drawing 3] It is drawing showing the radio structure of a system containing the radio communication equipment 6 which is the operation gestalt of further others of this

nvention.

[<u>Drawing 4]</u> It is drawing showing the radio structure of a system containing the radio communication equipment 7 which is the operation gestalt of further others of this

nvention.

[Drawing 5] It is drawing showing the configuration of the radio communication equipment 8 which is the operation gestalt of further others of this invention. [Drawing 6] It is drawing showing the radio structure of a system containing the radio communication equipment 9 which is the operation gestalt of further others of this invention

[<u>Drawing 7]</u> It is drawing showing the configuration of the radio communication equipment 10 which is the operation gestalt of further others of this invention. [<u>Drawing 8]</u> It is drawing showing the radio structure of a system containing the radio communication equipment 11 which is the operation gestalt of further others of this invention.

[Drawing 9] It is drawing showing the configuration of the radio communication equipment 12 which is the operation gestalt of further others of this invention.

[Drawing 10] It is drawing showing the radio structure of a system containing the radio communication equipment 13 which is the operation gestalt of further others of this invention.

[Drawing 11] It is drawing showing the example of a configuration of the question section 15 of the radio communication equipment 13 of  $\overline{\text{drawing }10}$ .

[Drawing 12] It is drawing showing the example of a configuration of the question section 16 of the radio communication equipment 13 of  $\overline{\text{drawing }10}$ .

[Drawing 13] It is an enlarged drawing near the antenna of the bidirectional Radio Communications Department 17 of the operation gestalt of further others of this invention.

[Drawing 14] It is drawing showing the basic configuration of the conventional bidirectional radio communication equipment 1.

[Drawing 15] It is drawing showing the interrogator 2 and the wireless tag 3 of a common RFID system.

[Description of Notations]

3 Wireless Tag

4, 5, 6, 7, 8, 9, 10, 11, 12, 13 Radio communication equipment

14 17 Bidirectional Radio Communications Department

15 16 Question section

19 Other Radio Communication Equipments

24 Antenna

40 Source of Transmission

42 Modulator

- 44 Signal Eliminator
- 46 Bidirectional Wireless Transmission and Reception and Wireless Tag Transceiver Common Antenna

.

- 48 Demodulator
- 49 Wireless Tag Demodulator
- 53 Wireless Tag Receiving Antenna
- 54 Wireless Tag Transceiver Antenna
- 57 Multifunctional Demodulator
- 62 Bidirectional Wireless Receiving Antenna
- 63 Wireless Tag Receiving Antenna
- 64 Demodulator
- 65 Signal-Processing Section
- 68 Wireless Tag Antenna
- 76 Bidirectional Wireless Transmission and Reception and Wireless Tag Transmitting

Common Antenna

86 Bidirectional Wireless Transceiver Antenna

[Translation done.]

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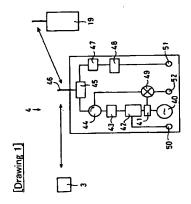
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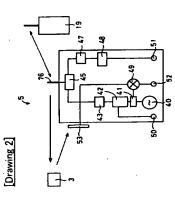
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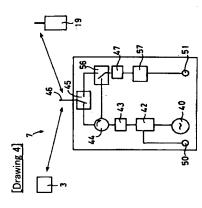
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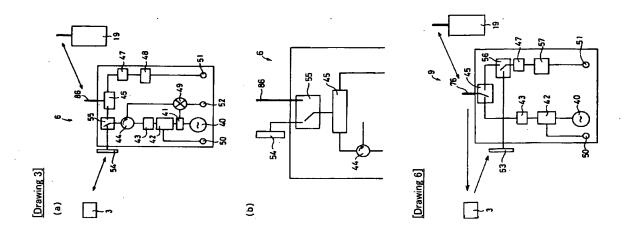
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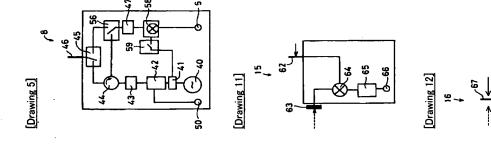
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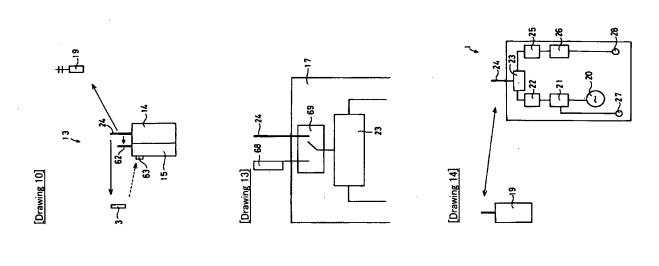


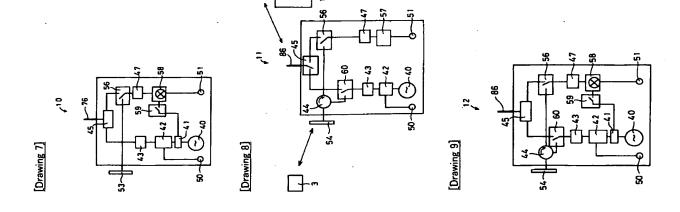


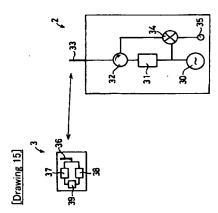












[Translation done.]

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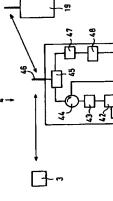
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無験通信装置および無額通信システム (54) [発班の名称]

(24) [四點]

器と無線LANや携帯電話など本格的な双方向無線通信 装置を融合させた無線通信装置およびこの無線通信装置 【禊ع】 | 簡単な構成でRFIDシステムにおける質問 を用いた無線通信システムを提供する。

送受信共通アンテナ46を用いて通信を行う。また、他 される。このような構成とすることよって、他の無線通 9 および無線タグ3 との通信が可能である、他の無線通 信装置19または無線タグ3との通信を行う際には、そ 4、送受分曜器 4 5 および双方向無線送受信・無線タグ の無根通信装置19から受信した信号は復調器48、無 線タグ3から受信した信号は無線タグ復耦器49で復躙 信装置19および無線タグ3と通信を1台の装置で行う ことができ、より低価格で、小型に装置を構築すること 【解決手段】 無線通信装置 4 は、他の無線通信装置 1 れぞれ共通の送信旗40、変調器42、送信RF部4



特許請求の範囲

て、アンテナから他の無線通信装置に送信し、他の無線 **番信装置からの信号をアンテナで受信し、復興する双方** 【請求項1】 送信源から発信される機送波を変調し 向無線通信手段と

れる情報を読み出す質問手段とを備えることを特徴とす テナから無線タグに信号を送信し、骸信号に応答し、配 覚される情報に基づいて変調して無線タグから送信され る信号をアンテナで受信し、復調して無線タグに記憶さ 送信源から発信される搬送波を変調または無変調でアン る無線通信装置

前記双方向無線通信手段の概送波を発信 は、共通であることを特徴とする請求項1配載の無線通 する送信顔と、質問手段の搬送波を発信する送信顔と 【請求項2】

ff記質問手段のアンテナとは、共通であることを特徴と 【精求項3】 前記双方向無線通信手段のアンテナと、 - る請求項1または2記載の無線通信装置。

旧質問手段のアンテナとはそれぞれ別々に設けられる 【請求項4】 前記双方向無線通信手段のアンテナと、 ことを特徴とする請求項1または2配載の無線通信装

前記質問手段の無線タグに送信するアンテナとは、共通 であることを特徴とする請求項1または2記載の無線通 【簡求項5】 前配双方向無線通信手段のアンテナと、

【精求項6】 前紀双方向無線通信手段の搬送被の変調 と、前配質問手段の撤送被の変調とは、共通の変調手段 で変調することを特徴とする請求項1~5のいずれか1

复調と、無線タグから送信される信号の復調とは、共通 の復調手段で復調されることを特徴とする諸求項1~6 【諸求項7】 他の無線通信装置から送信される信号の のいずれか1つに記載の無線通信装置。 つに記載の無線通信装置

ち向無線送受信アンテナと、他の無線通信装置から受信 る変糊手段と、前記変調手段からの信号を他の無線通信 【請求項8】 前記双方向無線通信手段は、搬送波を発 **言する送倡類と、前記送倡擬で発信した搬送被を変調す** 装置へ送信し、他の無線通信装置から信号を受信する双 した信号を復翻する復翻手段とを備え、

前記質問手段は、前記双方向無線通信手段の送信譲で発 する無線タグ受信アンテナと、無線タグ受信アンテナで **ヨする搬送波を用いて無線タグに信号を送信する無線タ** / 送信アンテナと、無線タグから送信される信号を受信 受信した信号を復調する無線タグ復調手段とを備えるこ とを特徴とする請求項1記載の無線通信装置。

る変調手段と、前配変調手段からの信号を他の無線通信 装置へ送信し、他の無線通信装置から信号を受信する双 【精求項9】 前配双方向無線通信手段は、搬送被を発 **言する送信淑と、前記送信淑で発信した搬送波を変調す** 

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ち向無線送受信アンテナと、他の無線通信装置から受信 **官する拠送彼を用いて無線タグに信号を送信する無線タ** 前配質問手段は、前配双方向無線通信手段の送信源で発 した信号を復調する復期手段とを備え、

【請求項10】 他の無線通信装置から送信される信号 ゲ送信アンテナと、無線タグから送信される信号を受信 または無線タグから送信される信号を選択的に復綱器に する無線タグ受信アンテナとを備え、無線タグから送信 される信号を前配双方向無線通信手段の復調手段で復聞 することを特徴とする請求項1配級の無線通信装置。 2

【請求項11】 前紀双方向無線通信手段の双方向無線 結合する信号結合器を備えることを特徴とする請求項9 配載の無線通信装配。

は、共通のアンテナであることを特徴とする請求項8~ 送受信アンテナと質問手段の無線タが送信アンテナと 0のいずれか1つに記載の無線通信装置。

を特徴とする請求項8~11のいずれか1つに記載の無 アンテナで受信した無線タグから送信される信号を、骸 信号を復闘する復調手段に送る信号分離器を備えること 【請求項12】 送信額からの信号をアンテナに送り、 ន

他の無線通信装置への送信信号と、他 の無線通信装置からの受信信号を分離する送受分離器が 散けられることを特徴とする請求項8~12のいずれか りに<br />
記載の<br />
無<br />
類<br />
通信<br />
装置。 【精求項13】 線通信装置。

【請求項14】 送信康で発信した搬送彼の一部を用い て、無線タグから送信される信号を復調することを特徴 とする閻状項1~13のいずれか1つに記載の無線通信 【請求項15】 前配送信源は双方向無線通信手段に股 前記双方向無線通信手段は、無線タグへ信号を送信する **454** S

アンテナを有することを特徴とする請求項2配載の無線

【間求項16】 双方向無線通信手段の行う他の無線通 **||装置への信号の送受信と、無線タゲへの信号の送信と** は、共通のアンテナによって行われることを特徴とする 通信裝置。

【請求項17】 双方向無線通信手段の行う他の無線通 信装置への信号の送受信と、無線タグへの信号の送信と は、別々のアンテナによって行われることを特徴とする **開水項15配載の無線通信装置** 

て変調された信号および双方向無線通信手段から送信さ いた信号を受信するアンテナを備えることを特徴とする 【請求項18】 質問手段は、無線タグで情報に基づい **育求項15~18のいずれか1つに記載の無線通信装** 請求項16記載の無線通信装置

て変調された信号を受信するアンテナと、双方向無線通 信手段から送信された信号を受信するアンテナとを別々 【請求項19】 質問手段は、無線タグで情報に基づい

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に備えることを特徴とする請求項15~18のいずれか ンに記載の無額通信装置。

する変綱手段と、前記変爛手段からの信号を他の無線通 **智装爾へ送信し、他の無線通信装置から信号を受信する** 双方向送受信アンテナと、他の無線通信装置から受信し 【間永頃20】 前紀双方向無頼通信手段は、搬送波を 発信する送信淑と、前配送信源で発信した搬送被を変調 た信号を復調する復調手段とを備え、

前記質問手段は、前配双方向無線通信手段の双方向送受 信アンテナから送信される信号を受信する双方向無線受 **信アンテナと、無線タグから送信される信号を受信する** 無粮タグ受信アンテナと、これらのアンテナで受信した 信号を混合復調する復調手段とを備えることを特徴とす る請求項2配載の無線通信装置。

ナと、無線タグ受信アンテナとは、共通であることを特 【都求項21】 前記質問手段の双方向無線受信アンテ 徴とする請求項20配載の無線通信装置。 【簡求項22】 精求項1~21のいずれか1つに記載 の無線通信装置と、

照線タゾとから構成されることを特徴とする無線通信シ

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前記無線タグには情報が雷き込み可能 であり、無線通信装置は無線で無線タグに情報を書き込 み可能であることを特徴とする精水項22配磁の無線通 [翻求項23]

「発明の詳細な説明】

0001

(発明の属する技術分野】本発明は、RFID機能と双 方向無線通信機能とを有する無線通信装置および無線通 信システムに関する。

[0000]

【従来の技術】従来、無線を用いた通信装置がある。図 機などの一般的な双方向無線通信装置1の基本構成を示 す図である。図14には、双方向無線通信装置1と双方 る。他の無級通信装置19は、双方向無線通信装置1が I 4は、無极L A N (Local AreaNetwork) や熱帯電話 面信する他の双方向無線通信装置や無線基地局である。 向の無模通信を行う他の無線通信装置19も示してい

【0003】双方向無線通信装置1は、送信源20、変 **顕器21、パワーアンプやフィルタなどから成る送信R** へ送信する信号と、無頼通信装置19から送信される信 号とを分離するスイッチまたはダイプレクサなどの送受 受信した信号を復調する復調器26、他の無線通信装置 F (Radio Frequency) 部22、他の無税通信装置19 分離器23、信号の送信および受信するアンテナ24、 低雑音アンプやフィルタなどから成る受信RF部25、

るフリケンシーホッピングを行う場合には、送信簿20 即御部などが必要であるが図14では省略する。送受分 **離器23は、TDD (Time Division Duplex) またはF** 処理する信号処理部や、送信する信号の周波数を変更す で発信する概送波の周波数を変えるためのシンセサイザ DD (Frequency DivisionDuplex) 方式によって、スイ ッチまたはダイプレクサを使い分ける。

線通信装置 1 に送信される変調信号は、アンテナ24で 【0004】図14の双方向無線通信装置1は、TDD 無線通信装置1の送信源20で発信する撤送液は、情報 **信号入力部27から入力された情報信号によって変調器** は、送信RF部22、送受分離部(スイッチ)23を介 してアンテナ2 4 から他の無粮通信装置 1 9 に向かって 送信される。一方、他の無線通信装置19から双方向無 受信し、送受分離器23および受信RF部25を経由し て復調器26で復調され、復開信号出力部28から情報 信号が取り出される。以上の双方向無頼通信装置1の動 方式の通信装置として、以下に動作を説明する。双方向 21で変調される。変調器21で変調された変調信号 作は、一般的な双方向無線通信の動作である。

4、およびタグ情報復調信号出力部35などを含み構成 される。他に、RF送信部、RF受信部、信号処理部お **グ3は、質問器2からの信号を受信し、また質問器2に** 信号を変調するタグ変調器37、タグアンテナ36で受 **信した信号を復調するタグ復調部38、データなどを記** 【0005】図15は、一般的なRFIDシステムの質 問器2および無線タグ3を示す図である。質問器2は無 サーキュレータや方向性結合器などから成る信号分離器 32、アンテナ33、同期検波器などから成る復興器3 よび無線タグ3への送信データを入力する情報信号入力 **邸などが必要であるが図15では省略している。無線タ** 信号を送信するタグアンテナ36、質問器2に送信する 線を用いた通信装置であり、送信滾30、変調器31、 段するメモリ39などを含み構成される。

は、アンテナ33で無線タグ3から送信される信号を受 【0006】以下に、質問器2および無線タグ3の動作 について説明する。質問器2によって、無線タグ3の情 報を読み出す場合、質問器2の送信譲30で発信する搬 送彼は変調器31で変調され、信号分離器32を介して **曽報によって変調を受ける。無線タグ3で変調された信** 号は、無線タグ3から質問器2に送信される。質問器2 れる。無線タグ3に情報を曹き込む場合には、曹き込み **曽報によって変調器31で送信源30で発信する搬送波** アンテナ33か5送信される。アンテナ33か5送信さ れる変糊信号は、無線タグ3のタグアンテナ36で受信 され、無線タグ3のタグ変調器37でメモリ39の蓄積 **冒する。アンテナ33で受信した変調信号は、信号分離** 器32を介して復羈器34に入力され、復羈器34で復 羂された後にタグ僧報復調信号出力部35から取り出さ を変調して無線タグ3に送信し、無線タグ3では受信し

と変糊信号をタグ復調部38で復興してメモリ39に曹 き込む。以上の質問器2および無線タグ3の動作は、 殺的によく知られたRFIDシステムの動作である。

質問器とは別に散けられた無線LANなどの双方向無線 ory Automation) 業務などにおいて活用されている。近 年、無線タグの小形化やパッテリーレス化によって物流 や流通分野で、在庫管理や品物を区分するピッキングシ ステムなどに幅広く利用されつつある。このような物流 **通信装置を用い即座にアクセスポイントに送られ、管理** れる。また無線タグへ情報を書き込む場合も、管理処理 処理部で処理し、物品を管理する形態がしばしば構成さ 【0007】従来から、RFIDシステムはFA(Fact や流通分野では、質問器で取得した無線タグの情報は、 耶からの指示によって質問器を用いて行われる。 [8000]

ຣ 【発明が解決しようとする課題】上述した従来の双方向 たとえば、携帯電話機のような能動的な双方向無線通信 無線通信装置1は、他の双方向無線通信装置と通信を行 **う機能を有しているが、無線タグとの通信を行う機能を 育していない。また、従来のRFIDシステムの質問器** 2は、無線タグ3との通信を行う機能を有しているが、 機能を有していない。

ピッキングシステムなどでは、無線LANなどの双方向 無線通信装置とRFIDシステムの質問器とは、両者が 送信源を持つ独立した装置であるので、装置が大きくな 【0009】また、従来のRFIDシステムを利用した り、コストがかかる。

業務などでのRFIDシステムの活用が極めて有効にな テムの活用が可能な無線通信装置が望まれている。さら ステムの質問器の機能とが一体となった無線通信装置が パイル無線通信の高速化と連動し、宅配業務や郵便配達 装置が簡略化および小型化され、低価格でRFIDシス に、広域通信も可能な双方向無線通信機能とRFIDシ 【0010】今後は、携帯電話機やBluetoothなどのモ る。このため、特にモバイル環境での利用においては、 望まれている。

びこの無線通信装置を用いた無線通信システムを提供す ステムにおける質問器と無線LANや携帯電話など本格 【0011】本発明の目的は、簡単な構成でRFIDシ 的な双方向無線通信装置を融合させた無線通信装置およ

【0012】また本発明の他の目的は、他の無線通信装 置への送信信号を利用して無線タグとの通信を行う無線 **通信装置および無線通信システムを提供することであ** 

[0013]

で受信し、復開する双方向無線通信手段と、送信源から 【觀題を解決するための手段】本発明は、送信源から発 言される搬送波を変調して、アンテナから他の無線通信 **坂間に送信し、他の無線通信装置からの信号をアンテナ** 

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情報信号入力部27から変調器21に入力するデータを

どを含み構成される。双方向無線通信装置1 では他に

19へ送信するデータなどを入力する情報信号入力部2 7、およびデータなどを取り出す復調信号出力部28な

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**党み出す質問手段とを備えることを特徴とする無線通信** 発信される搬送液を変調または無変調でアンテナから無 ンテナで受信し、復興して無線タグに記憶される情報を 泉タグに信号を送信し、敵信号に広答し、記憶される情 明に基づいて変調して無線タグから送信される信号をア

る。したがって、従来のように他の無線通信装置と無線 タグとの通信に、個別に独立した2つの装置を用いる必 【0014】本発明に従えば、双方向無線通信手段によ って他の無線通信装置との通信を行うことができ、また 質問手段によって無線タグとの通信を行うことができ

【0015】また本発明は、前配双方向無線通信手段の 敷送波を発信する送信源と、質問手段の搬送波を発信す る送信頑とは、共通であることを特徴とする。

5発信させた機送波を用いて行うので、装置の簡略化お 【0016】本発明に従えば、双方向無線通信手段の送 **国源と、質問器の送信源とを共通化し、他の無頼通信装** よび小型化を図ることができ、また製造コストの低減を **置との通信および無線タグとの通信とを1つの送信徴か** 図ることができる。

【0017】また本発明は、前配双方向無線通信手段の アンテナと、前記質問手段のアンテナとは、共通である ことを特徴とする。

【0018】本発明に従えば、1つのアンテナで他の無 て、装団の簡略化および小型化を図ることができ、また **泉通信装置および無線タグとの通信を行う。したがっ** 

【0019】また本発明は、前記双方向無線通信手段の アンテナと、前記質問手段のアンテナとはそれぞれ別々 関造コストの低減を図ることができる。 に設けられることを特徴とする。

【0020】本発明に従えば、他の無線通信装置との双 **方向無線通信を行うアンテナと、無線タグとの通信を行 シアンテナとの2つのアンテナを備えるので、他の無線** 曲信装置および無線タグとの通信にそれぞれ適したアン テナを用いて、それぞれの通信を行うことができる。

【0021】また本発明は、前配双方向無線通信手段の アンテナと、前記質問手段の無税タグに送信するアンテ ナとは、共通であることを特徴とする。

【0022】本発明従えば、無限タグに信号を送倡する に、その送信信号を用いて無線タグ信号を送信すること 場合、より広域な通信を行う双方向無線通信手段のアン テナを用いることができ、装圈の簡略化および小型化を 図ることがでるとともに、無線タグとの通信範囲が広く なる。また、他の無税通信装置への通信を行うと同時

【0023】また本発明は、前配双方向無級通信手段の 搬送波の変調と、前配質問手段の搬送波の変調とは、共 によって、電波を有効に利用することができる。 通の変調手段で変調することを特徴とする。

【0024】本発明に従えば、他の無線通信装置に送信

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する信号および無線タグへ送信する信号の変偶を共通の **変綱器で行う。したがって、装置の簡略化および小型化** を図ることができる。

【0025】また本発明は、他の無線通信装置から送信 される信号の復調と、無線タグから送信される信号の復 調とは、共通の復調手段で復調されることを特徴とす 【0026】本発明に従えば、他の無線通信装置からし た受信および無線タグから受信した信号の復梱を共通の 復類器で行う。したがって、装置の簡略化および小型化 を図ることができる。

**/ 送信アンテナと、無線タグから送信される信号を受信** する無線タグ受信アンテナと、無線タグ受信アンテナで 撤送波を変調する変調手段と、前配変調手段からの信号 信する敬送彼を用いて無線タグに信号を送信する無線タ は、搬送波を発信する送信源と、前配送信源で発信した を他の無線通信装置へ送信し、他の無線通信装置から信 **号を受信する双方向無線送受信アンテナと、他の無線通** 前記質問手段は、前記双方向無線通信手段の送信源で発 受信した信号を復調する無線タブ復調手段とを備えるこ 信装置から受信した信号を復調する復調手段とを備え、 【0027】また本発明は、前配双方向無線通信手段 とを特徴とする。

[0028] 本発明に従えば、質問手段は、双方向無線 信号を送信する。したがって、双方向無線通信手段に無 無線タグとの通信を行うことができる。したがって、装 線タグ送信アンテナおよび無線タグ受信アンテナと無線 タグ復綱手段とを備えるだけで、双方向無線通信および 通信手段の送信頼で発信する搬送波を用いて無線タグへ 間の簡略化および小型化を図ることができる。

する無線タグ受信アンテナとを備え、無線タグから送信 散送液を変調する変調手段と、前記変調手段からの信号 を他の無線通信装置へ送信し、他の無線通信装置から信 号を受信する双方向無線送受信アンテナと、他の無線通 信する概送彼を用いて無線タグに信号を送信する無線タ 7送倡アンテナと、無税タグから送信される倡号を受信 される信号を前記双方向無線通信手段の復調手段で復調 前記質問手段は、前記双方向無線通信手段の送信源で発 は、撤送液を発信する送信源と、前記送信源で発信した 信装置から受信した信号を復調する復調手段とを備え、 【0029】また本発明は、前記双方向無線通信手段 することを特徴とする。

双方向無線通信および無線タグとの通信を行うことがで 【0030】本発明に従えば、質問手段は、双方向無線 通信手段で発信する撤送液を用いて無線タグへ信号を送 段の復興器で復調する。双方向無線通信手段が、無線タ えることによって、双方向無線通信手段に無線タグ送信 信し、無線タグから送信される信号を双方向無線通信手 **ゾから送信される信号も復調可能な多機能復調器をそな** アンテナおよび無線タグ受信アンテナを備えるだけで、

きる。したがって、装置の簡略化および小型化を図るこ

される信号または無線タグから送信される信号を選択的 【0031】また本発明は、他の無線通信装置から送信 に復躙器に結合する信号結合器を備えることを特徴とす 【0032】本発明に従えば、信号結合器によって他の 無線通信装置から送信される信号と、無線タグから送信 される信号とを選択的に復調器に結合するので、前配2 したがって、1つの復躙器で前配2つの信号を復調する つの信号を同時に1つの復鞠器に入力することがない。 ことが可能である。

【0033】また本発明は、前紀双方向無線通信手段の 双方向無線送受信アンテナと質問手段の無線タグ送信ア 【0034】本発明に従えば、他の無線通信装置との通 ンテナとは、共通のアンテナであることを特徴とする。

る。無線タグに信号を送信する場合、より広域な通信を **言と、無線タグへの信号の送信とに同じアンテナを用い** るので、装置の簡略化および小型化を図ることができ

行う双方向無線通信手段のアンテナを用いることがで き、無線タグとの通信範囲が広くなる。

ナに送り、アンテナで受信した無線タグから送信される 【0035】また本発明は、送信源からの信号をアンテ 信号を、散信号を復調する復調手段に送る信号分離器を 備えることを特徴とする。

【0036】本発明に従えば、信号分離器によって、無 **泉タゲへの送信する信号と、無線タグから受信する信号** とを分離することができるので、同一のアンテナで無線 タグへ信号の送信および無線タグからの信号の受信を行 うことができる。 【0037】また本発明は、他の無線通信装置への送信 信号と、他の無線通信装置からの受信信号を分離する送 受分離器が設けられることを特徴とする。 【0038】本発明に従えば、たとえばダイプレクサや スイッチなどの送受分離器を備えるので、TDD (Tine Division Duplex) 方式やFDD (Frequency Division huplex)方式で他の無線通信装置との双方向無線通信を 行うことができる。

【0039】また本発明は、送信顔で発信した撤送彼の 一部を用いて、無線タグから送信される信号を復興する ことを特徴とする。

【0040】本発明に従えば、たとえば信号分配器など るので、同期検波のための発信源を別に作らなくても同 の搬送波を用いて無線タグから送信される信号を復調す を用いて送信源で発信した搬送波の一部を取り出し、こ 期検波を行うことができる。

【0041】また本発明は、前配送信源は双方向無線通 信手段に散けられ、前配双方向無線通信手段は、無線タ グへ信号を送信するアンテナを有することを特徴とす

送信および他の無線通信装置へのデータなどの送信の動 【0042】本発明に従えば、双方向無線通信手段が送 **討頒を有し、質問手段は送信源を持たなくても、前配双 方向無線通信手段の送信源から発信される信号をアンテ** ナから無線タグ送信することによって、無線タグの情報 を受信することができる。さらに、無線タグへの信号の 作を1つの送信信号エネルギーで同時に行わせることが

他の無線通信装置への信号の送受信と、無線タグへの信 【0043】また本発明は、双方向無線通信手段の行う **号の送信とは、共通のアンテナによって行われることを** 

の無線通信手段との通信および無線タゲへの信号の送信 [0044] 本発明に従えば、双方向無線通信手段の他 を同じアンテナで行うので、装置の簡略化および小型化 を図ることができる。

他の無線通信装置への信号の送受信と、無線タゲへの信 号の送信とは、別々のアンテナによって行われることを [0045]また本発明は、双方向無線通信手段の行う 特徴とする。

テナで行うので、それぞれに通信に適したアンテナを用 【0046】本発明に従えば、他の無線通信装置への信 号の送受信と、無線タゲへの信号の受信とは別々のアン いることができる。

報に基づいて変調された信号および双方向無線通信手段 【0047】また本発明は、質問手段は、無線タグで情 から送信された信号を受信するアンテナを備えることを

て信号を復興するので、装置の簡略化および小型化を図 双方向無線通信手段からの信号を同じアンテナで受信し 【0048】本発明に従えば、無線タグからの信号と、 ることができる。

報に基づいて変調された信号を受信するアンテナと、双 【0049】また本発明は、質問手段は、無線タグで情 方向無線通信手段から送信された信号を受信するアンテ ナとを別々に備えることを特徴とする。

の信号と、双方向無線通信手段からの信号を別々のアン 散送波を変調する変調手段と、前配変調手段からの信号 タグ受信アンテナと、これらのアンテナで受信した信号 【0050】本発明に従えば、質問手段は無線タゲから テナで受信するので、それぞれの信号の受信に適したア は、搬送波を発信する送信瀬と、前記送信旗で発信した を他の無線通信装置へ送信し、他の無線通信装置から信 号を受信する双方向送受信アンテナと、他の無線通信装 置から受信した信号を復調する復調手段とを備え、前配 ンテナと、無線タグから送信される信号を受信する無線 ンテナを用いて信号を受信して復躙することができる。 質問手段は、前記双方向無線通信手段の双方向送受信ア ンテナから送信される信号を受信する双方向無線受信ア 【0051】また本発明は、前配双方向無線通信手段

を混合復開する復翻手段を備えることを特徴とする。

【0053】また本発明は、前配質問手段の双方向無線・ ンテナで受信して、双方向無線通信手段から送信される 段するので、質問手段は送信領を備えなくても無線タグ 【0052】本発明に従えば、双方向無線通信手段のア ンテナから送信される信号を双方向無線受信アンテナで 信号と無線タグから送信される信号とを混合して復羈手 受信し、無線タグから送信される信号を無線タグ受信ア から送信される信号の同期検波を行うことができる。

受信アンテナと、無線タグ受信アンテナとは、共通であ 【0054】本発明に従えば、質問手段の双方向無線通 信手段から送信される信号と無線タグから送信される信 号とを同一のアンテナで受信するので、装置の簡略化お よび小型化を図ることができる。 ることを特徴とする。 2

【0055】また本発明は、前配無線通信装置と、無線 タグとから構成されることを特徴とする無級通信システ 455.

【0056】本発明に従えば、前記無線通信装置と無線 冒装置および無線タゲとの通信を行うので、設置などの した情報を双方向無線通信手段によって無線タグの情報 を管理する管理装置などに即座に情報を送信することが できる。また、無線通信装置は無線によって他の無線通 るので、たとえば、質問手段によって無線タグから受信 タゲとからなる無線通信システムを構成することができ 制約がない。 ຂ

き込み可能であり、無線通信装置は無線で無線タグに悄 【0057】また本発明は、前配無線タグには情報がむ 報を書き込み可能であることを特徴とする。

【0058】本発明に従えば、前配無椒通信装置によっ て、たとえば無線タグの情報を管理する管理装置などか ら情報を無線通信装置に送信し、無線通信装置から無線 タグに情報を送信して無線タグの情報を音き込むことが て無線タグに情報を費き込むことができる。したがっ でき、無線タグの管理を的確に行うことができる。 S

れる。なお、図1に示す無線タグ3および他の無線通信 ある無線通信装置1を含む無線通信システムの構成を示 向無線通信を行う他の無線通信装置19などから構成さ 装置19は、図14および図15に示した無線タグ3お よび他の無線通信装置19と同じであるので、同一の符 【発明の実施の形態】図1は、本発明の実施の一形態で 装置4の他に、無線タグ3および無線通信装置4が双方 号を付し、その説明を省略する。また、本実施形態に限 5ず、本発明の各実施形態の無線通信システムは、前記 無線タグ3 および他の無線通信装置19を含み構成され る。無線タグ3は、無線によってメモリに僧報を費き込 寸図である。図1に示す無線通信システムは、無線通信 [0.059]

【0060】無線通信装置4は、他の無線通信装置19

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グ3へ信号を送信する無線タグ送信アンテナと、無線タ 通信装置19に信号を送信し、他の無線通信装置19か ナとして機能する双方向無線送受信・無線タグ送受信共 通アンテナイ6、受信RF部47、復綱器48、無線タ との双方向無線通信を行う双方向無線通信手段と、無線 タグ3との通信を行う質問手段とから構成され、双方向 無線通信が可能な無線LANあるいは携帯電船機として 用いることができるとともに、無線タグ3との通信が可 能な質問器として用いることができる。無線通信装置4 は、送信漢40、信号分配器41、変調器42、送信R F 部43、信号分離器44、送受分離器45、他の無線 ら信号を受信する双方向無線送受信アンテナと、無線タ **ゾ3から送信される信号を受信する無線タグ受信アンテ** 7復調器 49、情報信号入力部 50、復調信号出力部 5 | およびタグ復調信号出力部52を含み構成される。

送波を変調する変調手段である変調器42、フィルタや 信装閏19に送信する信号および他の無線通信装置19 から送信される信号を分離する送受分離器45、双方向 無線送受信・無線タグ送受信共通アンテナ46、フィル タやアンプなどからなる受信R F 即 4 7、他の無線通信 装置19から送信される信号を復調する復調手段である 復調器48、変調器42で搬送波を変調するための情報 アンプなどから構成される送信R F 邸43、他の無頼通 を入力する僧報信号入力部50、および復調器48で復 閥された僣報を出力する復調信号出力部51を含み構成 搬送波を発信する送信源40、送信源10で発信した搬 【0061】無線通信装置4の双方向無線通信手段は

闘する変偶器42、フィルタやアンプなどから掲成され 信する送信版10、送信版10で発信する搬送被を取り 【0062】無線通信装置4の質問手段は、搬送波を発 る送信RF部43、サーキュレータやカプラなどから成 り、無線タグ3に送信する信号と無線タグ3から送信さ 7、無線タグ3から送信される信号を復調する無線タグ 山す信号分配器41、送信版40で発信した搬送液を変 6、フィルタやアンプなどから構成される受信RF部4 復調手段である無粮タグ復調器49、変調器12で搬送 0、および無線タグ復闢器48で復闢した信号を出力す 5、双方向無粮送受信・無粮タグ送受信共通アンデナ4 液を変調するための情報を入力する情報信号入力部5 れる信号とを分離する信号分離器14、送受分離器4 るタグ復調信号出力部52を含み構成される。

F 部 4 3、送受分離器 4 5、双方向無線送受信・無線 5 【0063】上述した双方向無線通信手段および質問手 ゲ送受信共通アンテナ46および情報信号入力部50を **共有化しているが、通信を行う信号形態によって変調器** 4 2、情報信号入力部50および送信RF部43等は分 段では、基本部として送信簿40、変調器42、送信R

【0064】無粮通信装置4の送信限40で発信する搬

れる信号を処理する信号処理部、復綱信号出力部51お しながら通信を行うフリケンシーホッピングを行う場合 よびタグ復類信号出力部52から出力される信号を処理 送波の周波数は固定されてもよく、また、周波数を変更 は、送信源40で発信する周波数を変換する周波数可変 機能を持つように構成してもよい。また、図1では、送 受分職器 4 5 にスイッチを用いた 場合にこのスイッチを 切り変えるための制御部、情報信号入力部50に入力さ する信号処理部などは省略している。

合、他の無線通信装置19から送信される信号は双方向 の通信を行う場合は、上述した双方向無線通信手段を用 いる。他の無線通信装置19に信号を送信する場合、送 号分離器 44、そして送受分離器 45を経由して双方向 される。この信号は対応する他の無線通信装置19に送 られる。本実施形態では、他の無線通信装置19との通 他の無線通信装置19から送信される信号を受信する場 【0065】次に、無線通信装置4の動作について説明 冒頂40で発信された搬送波は悄朝信号入力部50から 入力された情報に基づいて変調器 4 2 で変調される。変 隅器42で変調された変調信号は、送信RF部43、信 無線送受信・無線タグ送受信共通アンテナ 4 6 から送信 する。まず、他の無線通信装置19との双方向無線通信 を行う場合について説明する。他の無線通信装置19と **信にTDD(Time Division Duplex)通信を用いること** 無線送受信・無線タブ送受信共通アンテナ 4 6 で受信さ れ、受信RF47側に切り換えられた送受分離器(スイ ツチ)45を経由し、受信RF部41を通り、復興器4 として、送受分離器45にスイッチを使用する。一方、 8 で復調される。復調器 4 8 で復調された情報信号は、 復調信号出力部51から取り出される。

呼称する)について説明する。無線タグ3との通信を行 **冒号分離器44、送受分離器45を通り双方向無線送受** 無線タグ3との通信方式に違いがある場合には、より最 **適な変調器を別に設けてもよい。また、送信RF邸43** 【0066】次に、無線通信装置4をRF1Dシステム **信・無線タグ送受信共通アンテナ46から無線タグ3に** 送出される。本実施形態では無線タグ3との通信におい ての変調は、他の無線通信装置19との通信で用いられ の通信に用いる変調器と無線タグ3との通信を行う変調 の質問器として動作させる場合(以下、RFID動作と う場合は、上述した質問手段を用いる。まず、送信源4 る変異器42で行っているが、他の無線通信装置19と も最適な形態に分けてもよい。他の無線通信装置19と 器とを別々に散ける場合には、情報信号入力部50を2 0で発信した搬送彼は、変調器42、送信RF邸43、 系統設け、それぞれの変稠器に情報信号を入力する。

あるいは変闘器 42で無線タグ3の情報を読み出すため 【0067】無線タグ3に書き込まれている情報を読み **出す場合は、送信源40で発信した搬送波は無変調か、** 

の読出コマンド情報で変調される。この信号は双方向無

この無 通信の送信時でのスイッチの状態で行う。この構成によ **11、無線タグ3で受信される。無線タグ3では、無線通** 腺タグ3が有する蓄積情報で変調して送信する。無線タ **ソ3から送信された信号は双方向無税送受信・無線タグ** 送信系側に固定されか、あるいは、上述した双方向無線 って、他の無線通信装置19への送信時にRFID動作 送受信共通アンテナ46で受信され、送受分離器45で 分離される。RFID動作の場合、送受分離器8である スイッチは信号分離器44側、つまり変調器42のある **泉送受信・無線タグ送受信共通アンテナ 4 6 から送信さ** 冒装置4から送信されてくる信号を受信した後、

ន | を配置して取り出したものを用いてもよい。また、本 に送られる。無線タグ復闢器49は、信号分配器41で てもよい。無線タグ復調部49で復調された信号は、タ 実施形態の無線タグ復糊器49は、同期検波型の復鞠器 であるが、無線タグ復調器49は独立した復調器であっ 【0068】無線タグ3から折り返して送信された信号 は信号分職器44で分職された後、無線タブ復調器49 て、無線タグ3から送信される倡号を復調する同期検波 型の復羈器である。また、無線タグ復羈器49で同期検 彼に用いる信号は、変調器42の出力側に信号分配器4 取り出された送信環40からの搬送波の一部を入力し グ復糊信号出力部52から取り出される。

送信源40、送受分離器45、双方向無線送受信・無線 ように、それぞれの部分を共通して使用することによっ 用いればよい。また、無粮通信装置4を、たとえば双方 【0069】以上のように、本実施形態の無線通信装置 タグ送受信共通アンテナ46等を共有化している。この ものとして、送受分離器45をスイッチとしたが、FD D通信を行う場合には送受分離器としてダイプレクサを 向無線通信手段をベースにして構成する場合、この双方 向無線通信手段に信号分離器 4 4、無線タグ復闢器 4 9 他の無線通信装置19との通信だけでなく無線タグ3と 4 では、他の無線通信装置19との通信を行う双方向無 て、装置の簡略化および小型化を図ることができ、また **製造コストも抑えられる。また、本実施形態の無線通信** 機4では、TDD(Time Division Duplex)通信を行う **線通信手段と無線タグ3との通信を行う質問手段とで、** およびタグ復調信号出力部52を備える簡単な構成で、 の通信を行うことが可能となる。

【0070】図2は、本発明の他の実施形態である無線 通信装置5を含む無線通信システムの構成を示す図であ る。図2に示す無線通信装置5で、図1に示した前記実 施形態の無線通信装置4と重複する部分には同一の符号 号分離器は備えないが、更に無線タグ3から送信される を付し、その説明を省略する。無線通信装置5は、前記 実施形態の無線通信装置4とほぼ同様な構成であり、 **冒号を受信する無線タグ受信アンテナ53を備える。** 

【0071】無線通信装置5は、他の無線通信装置19

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との双方向無額涌信を行う双方向無線通信手段と、無線 用いることができるとともに、無線タグ3との通信が可 タグ3との通信を行う質問手段とから構成され、双方向 無線通信が可能な無線LANあるいは携帯電話機として 能な質問器として用いることができる。

タグ受信アンテナ53、無線タグ復興器49、情報信号 号入力部50および復興信号出力部51を含み構成され 信号分配器 41、変調器 42、送信RF部 43、送受分 ナ76、無線タグ3から送信される信号を受信する無線 入力部50およびタグ復綱信号出力部52を含み構成さ 45、他の無線通信装置19に信号を送信し、他の無線 通信装置19から信号を受信する双方向無線送受信アン テナと、無線タグ3へ信号を送信する無線タグ送信アン テナとして機能する双方向無線送受信・無線タグ送信共 通アンテナ7 6、受信R F 部 4 7、復興器 4 8、情報信 軽器45、双方向無線送受信・無線タグ送信共通アンテ 送信旗40、変調器42、送信RF部43、送受分離器 る。また、無線通信手段5の質問手段は、送信還40、 【0072】無線通信装置5の双方向無線通信手段は、 9

を行うことも可能である。

**信方式によって分けてもよい。このように、それぞれの** よび小型化を図ることができ、また製造コストも抑えら 質問手段において、送信頂40、変陥器42、送信RF 部43、送受分離器45、双方向無線送受信・無線タグ 送信共通アンテナ76および情報信号入力部50を共有 2、送信RF部43、送受分離器45などは両手段の通 部分を共通して使用することによって、装置の簡略化お 【0073】無線通信装置5では双方向無線通信手段と 化している。図1の無線通信装置4と同様に変調器4

9との通信動作は前記実施形態の無線通信装置4と同 【0074】無線通信装置5において他の無線通信装置 様であるので、説明を省略する。

【0075】以下に無線通信装置5のRFID動作につ いて説明する。無線タグ3との通信には上述した質問手 2、送信RF部43、送受分離器45を通り双方向無線 段を用いる。送信滾40で発信した搬送波は、変調器4 送受信・無線タグ送信共通アンテナ76から送出され

る。無線タグ3に魯き込まれている情報を読み出す場合 される。無線タグ3では、無線通信装置5から送信され 変調器42で無線タグ3の情報を読み出すための読出コ テナとしての役割を有する双方向無線送受信・無線タグ 送信共通アンテナ76から送信され、無線タグ3で受信 情報で変調して送出する。無線タグ3から送信された信 顕部49に送られる。無線タグ復闢部49は、信号分配 は、送信渡40で発信した搬送波は無変調か、あるいは マンド情報で変調される。この信号は無線タグ送信アン てくる信号を受信した後、この無線タグ3が有する蓄穣 号は無線タグ受信アンテナ53で受信され、無線タグ復 器41で取り出された送信頭40からの搬送波の一部を <del>\$</del> S

人力して、無線タグ3から受信した信号を復梱する。

[0076]以上のように、無線通信装置5は、双方向 無線送受信・無線タグ送信共通アンテナ76の他に無線 タグ3か5の信号を受信する無線タグ受信アンテナ53 を備える。無線タグ3への送信信号は、他の無線通信装 間との通信、つまり無線タグ3との通信よりも広範囲な 面合を行う双方向無線送受信・無線タグ送信共通アンデ ナ76を用いて送信し、無線タグ3か5の信号を指向性 の高い順線タグ受信アンテナ53を用いて受信すること によって、無線タグ3との通信を指して受信すること

【0078】無線通信装置6は、他の無線通信装置19との双方向無線通信を行う双方向無線通信を行う双方向無線通信手段と、無線タグ3との通信を行う質問手段とから構成され、双方向無線通信が可能を無線1ANあるいは携帯電路機として用いることができるとともに、無線タグ3との通信が可能な質問器として用いることができる。

して、無線タグ3から受信した信号を復調する。

【0079】無線通信装置6の双方向無線通信手段は、送信波40、変調器42、送信RF部43、アンデナ切り替えスイッチ55、送受分離器45、他の無線通信装置19広信号を受信する双方向無線送受信アンテナ86、受信RF部47、復調出48、情報通信装置6の質問手段は、送信策40、信号分配30および復調信号出力部51を含み해成される。また、無線通信装置6の質問手段は、送信策40、信号分配器41、変調器42、送信限下部43、信号分配器44、アンデナ切り替えスイッチ55、無線タグ3に信号を送信する無線タグ送信アンデナおよび無線タグ3から送信する無線タグ送信でフテナち4、無線タグ3から送信される信号を受信する無線タグ送信でフテナち4、無線タグ復調器44、簡報信号人対部55、無線タグ復調器30を含み構成され

[0080]上述した双方向無線通信手段および質問手段では、更に送信額 40、アンテナ切り替えスイッチ 5 などを共有化している。このように、双方向無線通信 手段および質問手段で、それぞれの部分を共通して使用 することによって装置の簡略化および小型化を図ること 50

いでき、また、製造コストの低減を図ることができる。 【0081】無額通信装置6の他の無線通信装置19と の通信動作は、アンテナ切り換えスイッチ55を双方向 無線送受信アンテナ86側に切り換えた状態で、前配実 施形態の無線通信装置4と同様に行われるので関明を省 【0082】以下に無線通信装電6のRF1D動作について説明する。無線タグ3との通信には上述した質問手段を用いる。送信第40で発信した搬送液は、変調器42、送信RF部43、信号分離器44、および無線タグ 送受信アンテナ54順に切り換えられたアンテナ切り換えスイッチ55を通り、無線タグ送受信アンテナ54か

5送信される。無線タグ3に費き込まれている情報を読

み出す場合は、送信額40で発信した搬送波は無変調か、あるいは変調器42で無線タグ3の情報を誘み出すための読出コマンド信報を信頼人力部50から入力することで変調される。変調器42から出力される信号は、アンテナ切り替えスイッチ55を通り、無線タグ送受信アンテナ54から送信され、無線タグ3で受信される。 無線タグ3では、無線通信装置6から送信されてる信号を受信した後、この無線タグ3が与する蓄積情報で変調して送出する。無線タグ3が与送出された信号は無線タグ3送受信アンテナ54で受信され、アンテナ切り換えスイッチ55、信号分離器44を通り、無線タグ復網部49に送られる。無線タグ復調部49は、信号分配器41で収り出された送信簿40からの搬送液の一部を入力1で吸り出された送信簿40からの搬送液の一部を入力 (0083)以上のように無筋通信装置らは、他の無額通信装置 9との通信を行う双方向無線送受信アンテナ8 6と、無線タグ3へ信号を送出および無線タグ3からの信号を受信する無線タグ送受信アンテナ5 4 と陥え、他の無線通信装置 19との通信または無線タグ3との通信によって、アンテナ切り換えスイッチ5 5を切り換え、双方向無線送受信アンテナ8 6と無線タグ3との通信によって、アンテナの10後2スイッチ5 5を切り換え、双方向無線送受信アンテナ8 6と無線タグ3との通信に対々のアンテナを用いることによって、それぞれの高にの特徴信装置 19との通信と無線タグ3との通信に別々のアンテオを用いることによって、それぞれの「通過合格徴を有効に発達さることができる。」

【0084】なお、図3(b)の局部図に示すように、 無線通信装置6ではアンテナ切り替えスイッチ55と無 級タグ送受信アンテナ54とを双方向無線送受信アンテ ナ86と送受分機器45との間に置いてもよい。これに よって、無線通信装置6は、通信環境によっては他の無 線通信装置19へ送信すると同時に無線タグ3との通信 を行うこともできる。

【のの85】図4は、本発明のさらに他の実施形態の無線通信装置7を含む無線通信システムの緯成を示す図である。図4に示す無線通信装置7で、図1に示した前記実施形態の無線通信装置1と重復する部分には同一の符号を付し、その説明を省略する。

[0086] 前記実施形態の無疑通信接限4.5.6で は、他の無疑通信装配19との通信など無線タグ3と の通信には194の復興器を用いたが、本実施形態の無線 通信装置14、他の無疑通信装配19 および無線タグ3と の通信によいて受信した信号を、1つの復興手段(多 機能復興器57)で復興する。通常、他の無疑通信装置 20.0及方向通信では、PSK(Pulse Sift Keying)など 00を関方式がよく使われる。一方、RFID動作の通信 の場合、単純なASK(Amplitude Sift Keying)など はPSKなどの変調方式が利用される。したがって、多 機能復興器57としては、PSK(QPSK同脚検波方 [0087]無線通信技電7は、他の無線通信装電19との双方向無線通信をでう双方向無線通信を行う双方向無線通信手段と、無線タグ3との通信を行う質問手段とから構成され、双方向無線通信が可能な無線しANあるいは携帯電話機として用いることができるとともに、無線タグ3との通信が可能な質問器として用いることができる。

式や遅延検波方式の復騆器を用いれば両通信に対して兼

【0088】無線通信装置7の双方向無線通信手段は、 送信源40、変鋼器42、送信RF部43、送受分離器 45、双方向無線送受信・無線タグ送受信共通アンテナ 46、他の無線通信装置19か5送信される信号または 無線タグ3か5送信される信号を選択的に多機能復調器 57に結合する信号結合器56、受信RF部47、多機 能復顕器57、情報信号入力部50および復興信号出力 部51を含み構成される。また、無線通信装置7の質問 等9技、送信源40、変調器42、送信RF部43、信 号分離器44、送受分離器45、双方向無線送受信・無 線タグ送受信共通アンテナ46、信号結合器56、受信 RF部47、多機能復顯器57、情報信号入力部50お よび復翻信号出力部51を含み棉成される。

[0089] 無鏡面信装置1において他の無線通信装置 19との通信動作では、通信方式によって信号結合器5 6であるスイッチを送受分機器45に接続した状態で、 前記実施形態の無線通信装置4と同様に行われるので説 明を省略する。なお、図3(b)の局部図で示したよう に、アンテナ切り替えスイッチと無線タグ送受信アンテ オとを双方向無線送受信・無線タグ送受信アンテナ

【0090】以下に、通信端末装置7のRFID動作に ついて啟明する。無線タグ3との通信を行う場合は、上 述した質問手段を用いる。送信第40で発信した搬送改 は、変調器42、送信RF部43、信号分離器44、お よび送受分離器45を通り双方向無線送受信・無線タグ 送受信技通アンテナ46から送信される。無線タグ3に 費き込まれている信報を修み出す場合は、送信選40で 発信した搬送故は無変調が、あるいは変調器42で無線 タグ3の信報を認み出すための認出コマンド情報で変調

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18 される。この信号は双方向無秘送受信・無線タガ送受信 共通アンテナ46から送信され、無線タガ3で受信され

どを用いてもよい。また、RFID動作では、送受信分 数能復調器 5.7 で復調された信号は、復興信号出力部 5 小型化を図ることができ、また、製造コストの低減を図 受信され、信号分離器44に送られる。無線タグ3から Fスイッチを用いているが、サーキュレータやカプラな **뾽器45であるスイッチは、送信系側に固定される。多** 【0091】以上のように、無線通信装置1の双方向無 **送受分離器 4 5、双方向無線送受信・無線タグ送受信共** 通アンテナ46、信号結合器56、多機能復鯛器57等 で変調して送出する。無線タグ3から送出された信号は 双方向無線送受信・無線タが送受信共通アンテナ46で 56、受信RF部47を通り、多機能復興器57で復興 される。無線通信装置7では、信号結合器56としてR を共通化して用いる。したがって、装置の簡略化および **共通アンテナ46から送信され、無線タグ3で受信され** る信号を受信した後、この無線タグ3が有する蓄積情報 受信した信号は信号分離器44で分離され、信号結合器 る。無線タグ3では、無線通信装置7から送信されてく 1 から取り出され、無線タグ3の蓄積情報が得られる。 泉通信手段と質問手段とは、基本部として送信蹴40、

【0092】また、本発明のさらに他の実施形態では、前記実施形態の無線通信装置70多機能復職器57をキャリア再生型の同期検波方式を用いた多機能復職器58としてもよい。図5は、本実施形態の無線通信装置8の組成を示す図である。図5に示す無線通信装置8で、図相成を示す図である。図5に示す無線通信装置8で、図1および図4に示した前記実施形態の無線通信装置4および7と直接する部分には同一の符号を付し、その説明を金略する。

ることができる。

[0093]無線通信装置8は、他の無線通信装置19 および無線タグ3との通信において受信した信号を、キャリア再生型の同期検波方式を用いた多機能復調器58で復調する。同期検波方式の復興器としては、復興器に発信器を設けPLL(PhaseLonkel Loop)回路によって受信した信号と位相同期した発信波を作り同期検波を行う方法や、コスタスループを使った方式など倒々の方法が用いられる。また、質問器として用いる場合は、同期検波用のキャリアとして、送信額40を利用する。無線透波を取り出し、この信号を、信号第スイッチ59を介して同期検波型の多機能復興器58に導する。多機能復興器58に導かれた信号は、同期検波用キャリアとして用いられる。

[0094] 本発明のさちに他の実施形態では、前記実施形態の無線通信技術70ように信号分権器44を用いて無線タグ3か5受信した信号を信号結合器56に送る傾成としないで、無線タグ3か5送信される信号を受信する無線タグ受信アンデナ53個え、この無線タグ受信アンデナ53個え、この無線タグ受信のアンデナ53個な、この無線タグ受信のアンデナ53個な、この無線タグ受信のアンデナ53個などの無線タグ受信

示す無极通信装置ので、図2および図4およびに示す前 成としてもよい。図6は、本実施形態の無線通信装置9 を含む無粮通信システムの構成を示す図である。図6に 記実施形態の無線通信装置 5 および 7 と重複する部分に は同一の符号を付し、その説明を省略する。

用いることができるとともに、無線タグ3との通信が可 タグ3との通信を行う質問手段とから構成され、双方向 【0095】無線通信装置9は、他の無線通信装置19 との双方向無線通信を行う双方向無線通信手段と、無線 無報通信が可能な無線しANあるいは携帯電路機として 能な質問器として用いることができる。

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テナとして機能する双方向無観送受信・無線タグ送信共 過アンテナ76、無線タグ受信アンテナ53、信号結合 器56、受信RF部56、多機能復調器57、情報信号 入力部50、および復期信号出力部51を含み構成され 6、信号結合器56、受信RF部47、多機能復調器5 7、情報信号入力部50、および復興信号出力部51を 送信减10、変調器12、送信RF部13、送受分職器 送信饭40、変開器42、送信RF部43、送受信分離 45、双方向無報送受信・無線タグ送信共通アンテナ7 部45、無線タグ3に信号を送信する無線タグ送信アン 【0096】無粮通信装置9の双方向無粮通信手段は、 含み構成される。また、無線通信装置9の質問手段は、

【0097】無粮通信装置9の双方向無粮通信手段と質 6、信号結合器56、多機能復調器57等を共有化して 間手段とは、基本部として送信爾40、送受分離器4 5、双方向無額送受信・無線タグ送信共通アンテナ7

【0098】無線通信装置9は、無線タグ3から送信さ れる信号を受信する無粮タグ受信アンテナ53を備える ので、無線タグ3への送信信号は、他の無線通信装置と の道信、つまり無線タグ3との通信よりも広範囲な通信 を行う双方向無線送受信・無線タグ送信共通アンテナ7 6を用いて送信し、無极タグ3からの信号を指向性の高 い無線タグ受信アンテナ53を用いて受信する。このよ **らに、指向性の高い無線タグ受信アンテナ53を用いる** ことによって、無線タグ3からのより微弱な信号を受信 することができる。

【0099】無線通信装置9のRF1D動作は、上述し 無変調ないし一部変調した状態で送信RF部43、送受 分離器15、双方向無線送受信・無線タグ送信共通アン テナ76を通して送出され、無粮タグ3に至る。無粮タ グ3から返送された信号は、無線タグ受信アンテナ53 に入り復調され、無線タグ3の情報が復調信号出力部5 1から取り出される。無線タグ3からの返送される信号 で受信され、信号結合器56を介して多機能復調器57 の一部は双方向無線送受信・無線タグ送信共通アンテナ た質問手段を用いる。送信源40で発信した搬送波は、

の工夫することによって問題にはならない。 他の無線通 **信装置19との通信動作は、無線タグ受信アンテナ53** は特に関与せず、図4の無線通信装置7と同様であるた め、説明は省略する。

質問手段で共通の部分を用いることによって、装置の簡 略化および小型化を図ることができ、また製造コストを 【0100】以上のように、双方向無粮通信手段および 圧減することができる。

もよい。図7は、本実施形態の無線通信装置10の構成 を省略する。また、他の無線通信装置との通信動作およ 施形態の無線通信装置9の多機能復躙器57をキャリア を示す図である。本実施形態の無線通信装置10で、図 5 および図 6 に示した前記実施形態の無線通信装置 8 お よび9と重複する部分には同一の符号を付し、その説明 びRFID動作は基本的に前記実施形態の無線通信装置 【0101】本発明のさらに他の実施形態では、前記実 再生型の同期検波方式を用いた多機能復調器58として 7 と同様であるので、その説明を省略する。

タグ3へ信号を送信および無線タグ3から送信される信 【0102】図8は、本発明のさらに他の実施形態の無 線通信装置 1 1 を含む無線通信システムの構成を示す図 である。本実施形態の無線通信装置11で、前配実施形 し、その説明を省略する。無線通信装置11は、前記実 施形態の無線通信装置7とほぼ同様な構成であり、無線 態の無線通信装置と重複する部分には同一の符号を付

号を受信する無線タブ送受信アンテナ54と、他の無線 通信装置19および無線タグ3との通信によって双方向 無椒送受信アンテナ86と無線タグ送受信アンテナ54 【0103】無線通信装置11は、他の無線通信装置1 とを切り換える信号結合器60を備える。

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9との双方向無線通信を行う双方向無線通信手段と、無 線タグ3との通信を行う質問手段とから構成され、双方 向無線通信が可能な無線LANあるいは携帯電話機とし て用いることができるとともに、無線タグ3との通信が 【0104】無線通信装置11の双方向無線通信手段 可能な質問器として用いることができる。

は、送信演40、変綱器42、送信RF部43、信号結 57、情報信号入力部50および復興信号出力部51を は、送信頭40、変調器42、送信RF部43、信号結 合器60、送受分離器44、無線タグ送受信アンテナ5 、情報入力部50および復興信号出力部51を含み構 合器60、送受分離器45、双方向無線送受信アンテナ 86、信号結合器56、受信RF部47、多機能復調器 1、倡号結合器 5 6、受信 R F 部 4 7、多機能復調器 5 含み構成される。また、無線通信装置11の質問手段

0、信号結合器56、受信RF部47、多機能復調器5 【0105】無線通信装置11の双方向無線通信手段と 質問手段とは、基本部として送信源40、信号結合器6 7 等を共通化して用いる。このような構成とすること

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7.6に入力されるが、これは送信RF部43の構成など

で、装置の簡略化および小型化を図ることができ、製造

コストの低減が可能である。

問手段を用いて行われる。送信領40からの搬送被は変 復躙器57で復躙される。このように、他の無線通信装 の通信を行う場合には、信号結合器60(本実施形態で はスイッチ) および信号結合器 56 である RFスイッチ **顕器42、送信RF部43、信号結合器60、および信** 号分離器 4 4 を経由して無線タグ送受信アンテナ 5 4 か 5送出される。無線タグ3からの信号は無線タグ送受信 て、倡号結合器56、受信RF部47を経由して多機能 置または無線タグ3との通信の場合で、それぞれの通信 [0106]無線通信装置11は、他の無線通信装置と を送受分離器45側に接続し、上述の双方向無線通信手 び信号結合器56を信号分離器14に接続し、上述の質 う。一方、RFID動作の場合は、信号結合器60ねよ アンテナ54で受信され、信号分離器44で分離され 段の双方向無線送受信アンテナ86を用いて通信を行

施形態の無線通信装置11の多機能復調器57をキャリ を付し、その説明を省略する。本実施形態の無線通信装 を用いた多機能復調器58で復調する。他の無線通信装 【0107】本発明のさらに他の実施形態では、前配実 ア再生型の同期検波方式を用いた多機能復躙器としても よい。図9は、本実施形態の無線通信装置12の構成を 示す図である。 本実施形態の無線通信装置12で、 前記 実施形態の無線通信装置と重複する部分には同一の符号 閏12は、他の無線通信装置および無線タゾとの通信に おいて受信した信号を、キャリア再生型の同期検波方式 **置および無線タグとの通信動作は、前記実施形態の無線 通信装置11と基本的に同じであるので説明を省略す** 

装置19と通信を行う双方向無線通信手段である双方向 ある。本実施形態の無線通信装置13は、他の無線通信 【0108】図10は、本発明のさらに他の実施形態の 無線通信装置13を含む通信システムの構成を示す図で 無線通信部14および無線タグとの通信を行う質問手段 である質問部15を含み構成される。

の説明を省略する。双方向無線通信部14と質問部15 【0109】双方向無線通信部14は、図14に示した **従来の双方向無線通信装置1と同様な構成であるのでそ** とは脱着可能に構成することもできる。

【0110】図11は、無線通信装置13の質問部15 部14のアンテナから送出される信号を直接受信する双 の構成を示す図である。質問器15は、双方向無線通信 方向無線受信アンテナ62、無線タグ3から送出された 4、信号処理部65および復調信号出力部66を含み構 信号を受信する無線タグ受信アンテナ63、復興器6

ついて説明する。双方向無線通信部14は、通信を行う 【0111】次に、無線通信装置13のRF1D動作に

(15)

**铸隅2002-353852** 

ためにアンテナ24から信号を発信する。アンテナ24

形態では、無線タグ受信アンテナ63は指向性のある平 信号の一部は、質問部15の無線タグ受信アンテナ63 にも至るが、その大きさは双方向無観受信アンテナ62 の指向性の設計によって閲整される。たとえば、本実施 であるが、双方向無線装置との19との信号の送受信お した信号は、他の無線通信器19に向けて発せられると 司時に、ある距離に存在する無線タグ3にも至り、さら にアンテナ24の付近に近傍に配置される質問部15の 双方向無線受信アンテナ62にも入力される。この送信 **よび、無線タグへの信号の送信、および質問手段のアン** テナ63への信号の送信を行う。 アンテナ24か5発信 は、図14に示した従来のアンテナ24と同じアンテナ 面アンテナとし、質問部15の側面に配置する。

3内に保有された情報で変調され、その変調信号は無線 変綱信号は、質問部15の無線タグ受信アンテナ63で 岡信号が復興される。復興器64において復興された偉 取り出される。無線タグ3から取り出された情報は、信 タグ3から放出される。この無線タグ3から放出された 受信され、同期検波器などから模成される復興器64に 3からの変調信号と混合復調され、無線タグ3からの変 **報は信号処理器65を通して、復職信号出力部66から** 【0112】無線タグ3に入力された信号は、無線タグ 入力される。一方、質問部15は、双方向無線受信アン テナ62で受信した双方向無粮通信部14のアンテナ2 4から送出された信号も復蠲器64に入力し、無線タグ 号処理器65に蓄積されるか、または双方向通信部14 によって他の無線通信装置19に送信することもでき R

に適したアンテナに切り換えられ利用される。

どで変調された場合、双方向無線受信アンテナ62は必 ずしも必要でなく、無線タグ3からの変調信号を無線タ 幅に簡略化され、また他の無線通信装置19との通信を 【0113】また、無粮タグ3において単純なASKな グ受信アンテナ63で受信し、復調器64でAM復調す 3では、双方向無線通信部24から送信される信号を用 いて、無線タグ3から情報を読み取るので、質問器は大 行う際に無線タグ3の読み取りを行えば、配波を有効に 【0114】このように、本実施形態の無線通信装置1 ることで、無線タグ3の僧報を取り出すこともできる。 利用することができる。 Ş

**腺通信部14からの信号および無線タグ3から放出され** に示した前記実施形態の質問部15のように、双方向無 い。この場合、双方向無線通信部14からの信号と無線 タグ3からの変調信号を1つのアンテナ67で受信する た変調波を別々のアンテナで受信するのではなく、図1 2に示すように、同一のアンテナ67で受信してもよ 【0115】本発明のさらに他の実施形態では、図1

器65は同期検波方式であるので同期検波特有のヌル点 のため、これらの信号が特定の受信関係にあると、復躙 とめ両者の位相差を自由に散定することができない。 S

は、たとえば特開平7-131403号公報に開示され る。このような構成とすることによって、質問部16の (特定条件で復期出力が0となる) が生じる。この問題 ている周波数ホッピング方式を用いることで解決でき 簡略化および小型化を図ることができる。

指向性が高いアンテナを用いることによって、無線タグ アンテナを2つ散ける構成としてもよい。図13は、本 の拡大図である。双方向無線通信部17は、従来の双方 他の無粮通信装置19との通信を行うアンテナ24の他 図10に示した前記実施形態の双方向無線通信部14に 実施形態の双方向無線通信部17におけるアンテナ近傍 **向無線通信装置 1 と同様な構成であり、アンテナの部分** に、無線タグ3に信号を発信する無線タグ送信アンテナ 68 および、アンテナ24と無線タグアンテナ68とを 無線タグ送信アンテナ68には、アンテナ24に比べて 切り換えるアンテナ切り替えスイッチ69とを備える。 のみが異なる。本実施形態の双方向無線通信部17は、 【0116】また、本発明のさらに他の実施形態では、 3との通信懸度を高めることができる。

は、無線タグ3との通信において無線タグ3に蓄積され が、無粮タグ3への情報の費き込み動作は、通常実施さ れているように無線通信装閥の送信信号にたとえばAS K変調を与えて、無線タグ3で復調することなどによっ 【0117】また上述した各実施形態の無線通信装置 ている情報を読み取る動作についてしか述べていない 4, 5, 6, 7, 8, 9, 10, 11, 12, 137 て容易に実現することができる。

通信装置との通信と、無線タグとの通信とを同じ装置で び小型化を図ることができ、より低価格に装置を構築で 行うことができる。したがって、他の無穀通信装留との 通信を行う装置およびの無線タグとの通信を行う装置の 【発明の効果】以上のように本発明によれば、他の無線 両者を個々に使う場合に比べ、装置の構成の簡略化およ

**ゲ情報を、たとえば、この無粮タグの情報を管理する遠** 隔の僧報センタなどにも即座に送信することができ、ま [0119] さらに、無線によって他の無線通信装置お た情報センタから無線タグに情報を提供することもでき 構内、広域などのモバイル環境において取得した無線タ よび無線タグとの通信を行うことで、固定利用に加え、

させた信号を用いて行うことができるので、装置の構成 を簡略化することができ、装置の小型化を図ることがで の通信および無線タグとの通信を同一の送信徴から発信 【0121】また本発明によれば、1つのアンテナで他 [0120]また本発明によれば、他の無線通信装置と きる。さらに、製造コストを抑えることができる。

の双方向通信を行うアンテナと、無線タグからの信号の 受信を行うアンテナを備えるので、他の無線通信装置お 【0122】また本発明によれば、他の無粮通倡装置と よび無線タグとの通信にそれぞれ適したアンテナを用い できる。さらに、製造コストを抑えることができる。 て通信を行うことができる。

テナとを共通で使用するので、装置の簡略化および小型 化を図ることができるとともに、より広域な通信を行う 双方向無線通信手段のアンテナによって、無線タガへ信 【0123】また本発明によれば、他の無粮通倡装置と **画信を行うアンテナと、無線タグへ信号を送信するアン** 号を送信することができるので、無線タグとの通信範囲 が広くなる。

也の無線通信装置に送信する信号および無線タグへ送信 【0124】また本発明によれば、通信方式によっては 化および小型化を図ることができる。さらに、製造コス する信号の変調を共通の変調器で行うので、装置を簡略 トを抑えることができる。

を共通の復調手段で行うので、装置を簡略化することが でき、装置を小型化することができる。さらに、製造コ 【0125】また本発明によれば、他の無線通信装置か 5受信した信号および無線タグか5受信した信号の復調 ストを抑えることができる。

【0126】また本発明によれば、双方向無線通倡手段 よび無線タグとの通信を行うことができるので、他の無 容易に構成でき、また、装置の簡略化および小型化を図 無線タグ復調手段とを備えるだけで、双方向無線通信お 線通信装置および無線タグと通信可能な無線通信装置を に無線タグ送信アンテナおよび無線タグ受信アンテナと ることができる。 【0127】また本発明によれば、他の無線通信装置お とができるので、装置の簡略化および小型化を図ること よび無線タグとの通信にほば同一の部品を用いて行うこ ができ、製造コストを低減することができる。

【0128】また本発明によれば、信号結合器によって 他の無線通信装置から送信される信号と、無線タグから つの復調器で前記2つの信号を復調することが可能であ 送信される信号とを選択的に復耦器に結合するので、1

の双方向無線送受信アンテナと質問手段の無線タグ送信 アンテナとを共通して用いるので、必要により無線タグ 【0129】また本発明によれば、双方向無線通信手段

て、無線タグの送信信号と受信信号とを分離することが できので、1つのアンテナで無線タグへの信号の送信お **よび無線タグから送信される信号の受信を行うことがで** 【0130】また本発明によれば、信号分離器によっ との通信をより広範囲で行うことができる。 κο No

【0131】また本発明によれば、送受分離器によって 1つのアンテナで他の無線通信装置への信号の送信およ

間を簡略化することができ、装置の小型化を図ることが 50

の無線通信装置および無線タグとの通信を行うので、装

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び他の無線通信装置からの信号の受信を行うことができ

【0132】また本発明によれば、送信源で発信した撒 送波を用いて無線タグから送信される信号を復調するの で、同期検波を行うための発信源を別に作る必要がな

5送信される信号を復調するので、同期検波のための発 【0133】また本発明によれば、送信源で発掘した搬 送波の一部を取り出し、この撤送波を用いて無線タグか 信源を別に作らなくてもよい。

とができ、装置を簡略化することができる。さらに、他 **诗たなくても、双方向無粮通信手段のアンテナから無粮** 【0134】また本発明によれば、質問手段は送信策を の無線通信装置への通信に際し散乱する通信エネルギー タグへ信号を送信し、無線タグからの情報を受信するこ を利用し、無線タグとの通信を行うことができるので、 間報通信の省エネルギー化にも役立つ。

の信号の送受信と、無線タグへ信号の送信とを共通のア 【0135】また本発明によれば、他の無線通信装置へ ンテナで行うことよって、装置を小型化することがで き、また、製造コストを抑えることができる。

の信号の送受信と、無線タグへ信号の送信とを別々のア ンテナによって行うので、それぞれの通信に適したアン 【0136】また本発明によれば、他の無線通信装置へ テナを用いて通信を行うことができる。 [0137] また本発明によれば、無線タグからの信号 と、双方向無線通信手段からの信号とを同じアンテナで 受信するので、装置を簡略化でき、小型化することがで 【0138】また本発明によれば、無線タグからの信号 で受信するので、それぞれの通信に適したアンテナを用 と、双方向無線通信手段からの信号とを別々のアンテナ いて通信を行うことができる。

無飯通信手段から送信される信号を直接受信して、これ 【0140】また本発明によれば、質問手段は1つのア ンテナで双方向無線通信手段から送信される信号と、無 **腺タグから送信される信号とを受信するので、装置の簡** 【0139】また本発明によれば、質問手段は送信源を **持たなくても、無頼通信手段から他の無頼通信装置へ信** 号が送信されるとき、同時に無頼タグへも信号が送信さ れ、無線タグから返送される倡号を受信し、また双方向 らの信号を混合して復調するので、質問手段は送信嬢を 時たなくても、無線タグとの通信を行うことができる。 略化および小型化を図ることができる。

とができる。また、無線通信装置は無線によって他の無 【0141】また本発明によれば、前配無線通信装置と **無線タグとからなる無線通信システムを構成することが** できるので、たとえば、質問手段によって無線タグから 受信した情報を双方向無線通信手段によって無線タグの **背報を管理する管理装置などに即座に情報を送信するこ** 

特開2002-353852 **泉通信装置および無線タグとの通信を行うので、散置な** 

よって無線タグに情報を暫き込むことができる。したが から僣殻を無線通信装置に送信し、無線通信装置から無 泉タグに情報を送信して無線タグの情報を書き込むこと 【0142】また本発明によれば、前配無線通信装置に って、たとえば無線タグの情報を管理する管理装置な

【図1】本発明の実施の一形態である無線通信装置4を 【図2】本発明の他の実施形態である無線通信装置5を 含む無線通信システムの構成を示す図である。 含む無粮通信システムの構成を示す図である。

ができ、無線タグの管理を的確に行うことができる。

【図画の簡単な説明】

【図5】本発明のさらに他の実施形態である無線通信装 【図3】本発明のさらに他の実施形態である無線通信装 【図4】 本発明のさらに他の実施形態である無線通信装 酉7を含む無粮通信システムの構成を示す図である。 閏6を含む無锒通信システムの構成を示す図である。

【図6】本発明のさらに他の実施形態である無線通信装 暦8の構成を示す図である。

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【図7】 本発明のさらに他の実施形態である無線通信装 間9を含む無線通信システムの構成を示す図である。 图10の構成を示す図である。

【図8】 本発明のさらに他の実施形態である無線通信装 【図9】 本発明のさらに他の実施形骸である無線通信装 間11を含む無頼通信システムの構成を示す図である。 置12の構成を示す図である。

【図10】本発明のさらに他の実施形態である無線通信 装置13を含む無粮通信システムの構成を示す図であ 【図11】図10の無線通信装置13の質問部15の構 成例を示す図である。

【図12】図10の無線通信装置13の質問部16の構 【図13】本発明のさらに他の実施形態の双方向無線通 成例を示す図である。

【図14】 従来の双方向無線通信装置1の基本構成を示 信部17のアンテナ近傍の拡大図である。 一図である。

【図15】一般的なRFIDシステムの質問器2および 無線タグ3を示す図である。

(年号の親明) 3 無線タグ 1, 5, 6, 7, 8, 9, 10, 11, 12, 13 **泉通信装置** 

兼

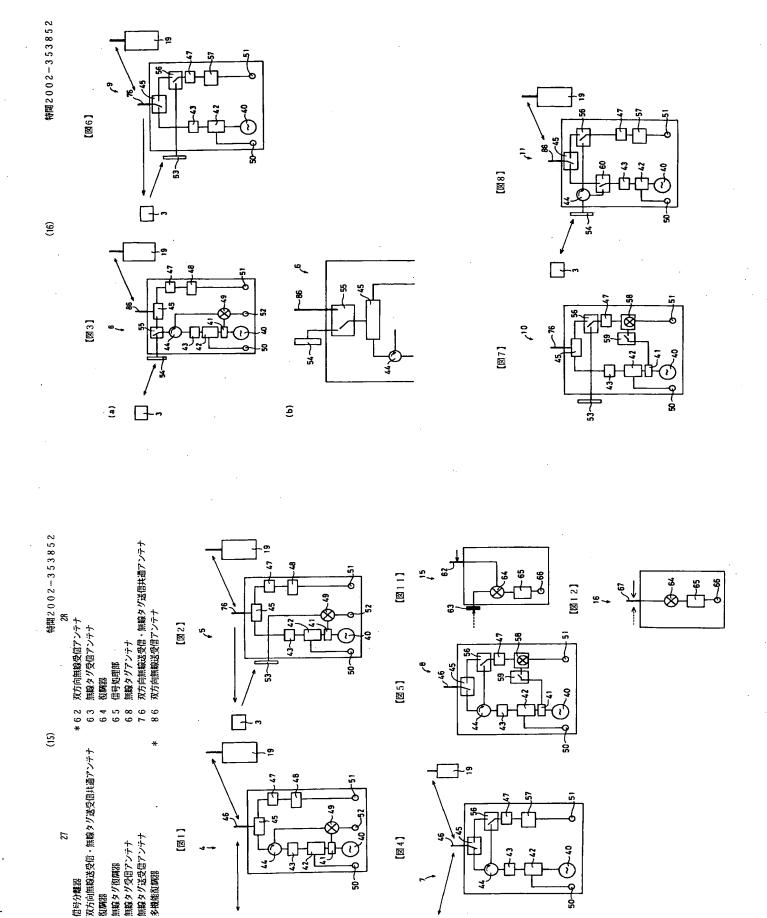
14, 17 双方向無線通信部

19 他の無線通信装置 5, 16 質問部

アンテナ 10

変開器 4 2

S



無線タゲ復興器 46 双方向無秘法受 48 数函器 49 無報タグ復四器 53 無報タグ受信で 54 無線タグ送受信 57 多機能復國器

信号分離器

特開2002-353852

(1)

F ターム(参考) 5K011 RA01 RA03 CA11 CA12 DA05 NA15 DA21 DA26 JA01 JA03 (72)発明者 中野 洋 大阪府大阪市阿伯野区長池町22番22号 シャープ株式会社内 フロントページの統含

[図14] [018] 7年8日 [图13] (6國)

[図15]